Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone Sound Waves
PUBLISHED WEEKLY BY TELEPHONY PUBLISHING CORP.
608 S. Dearborn St., CHICAGO

H. D. FARGO, PRESIDENT AND TREASURER
S. R. EDWARDS, EDITOR AND SECRETARY

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Entered as second-class matter September 4, 1908, at the postoffice at Chicago, Ill., under act of March 3, 1879.

Volume 101
Number 15

CHICAGO, SATURDAY, OCTOBER 10, 1931

Subscription — 10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

JUSTIFYING ADEQUATE RATES DURING THE BUSINESS DEPRESSION

More than ever before, telephone companies at this time need to be especially careful in their relations with their subscribers. Times are tense; people are on edge, and tact and diplomacy are needed.

The demand for lower rates—especially on the smaller companies—is usually based on one of two reasons—either to keep step with the drop in other commodity prices, or for the personal, human reason that the subscriber cannot afford to pay present charges.

* * * *

The latter plea was met by a utility commission recently with the terse statement phrased something like this: "It's too bad you can't afford to pay the existing rate, but the commission can't reduce it for that reason alone.

"The law says the company is entitled to a certain return on the investment. It doesn't say the rates must come down because the customers say they can't afford to pay that much."

* * * *

The commission was legally right, although the reply amounted to the ultimatum, "Take it or leave it."

Maybe a commission can take that attitude justifiably, but no service company can afford to dismiss the matter in such an offhand way. It would result in a loss of too many subscribers. The company cannot say to the public in effect, "Take it or leave it," but must take pains to explain the conditions and induce the patrons to understand the situation.

The other reason advanced for a reduction in rates—namely, because most other prices are down—calls for specific facts to convince the telephone users that they are not being imposed upon. Here is where the company should furnish its subscribers with accurate and adequate information showing why service rates cannot be raised and lowered to conform to the changes in the general commodity market.

In this issue of TELEPHONY will be found an article describing how Nebraska companies, under the guidance of the state telephone association, explain to the public why their operating costs do not come down when other prices decline.

The necessity of informing all subscribers—and especially those who are grumbling about rates—how and why the telephone business differs from general merchandizing, is apparent to all familiar with the problem, and companies facing such demands will find in this article plenty of material with which to prove their case.

It all goes back to the proposition that the service company cannot base its rates on business conditions. It cannot increase rates when business is booming, or reduce them during a depression.

The Farm Problem.

In the October 1 issue of Public Utilities Fortnightly appears the following editorial comment under the title, "A Unique Proposal to Help the Farmer—at the Expense of the Telephone Industry":

"Times are hard for the farmers. Everyone seems to be trying to help them. Most of this help is in the form of suggestions as to how someone else might help the farmer. Among the many suggestions as to how the farmer's burden might be lightened during the coming winter is the proposition that all rural telephone rates ought to be reduced by a certain blanket percentage.

Here is a suggestion that was prompted, no doubt, by a laudable motive. A blanket rate cut for rural telephone companies would not be so discriminatory because it is no secret that many telephone companies in mid-western agricultural states have not been earning a fair return for many months. Aside from the purely legal aspect of unconstitutional confiscation, there ought to be some honest doubts as to the equity of making small telephone companies 'donate,' in part at least, service to the stricken farmer.

The movement is abroad throughout the middle western states. It has been particularly current in Nebraska where Chairman C. A. Randall, of the state railway commission, has served notice that he is opposed to any such policy. He takes the position that each case—that is, the petition for rate reduction as to each company—ought to be considered on its own merits.

The telephone journal, TELEPHONY, commenting on this situation, points out that in addition to ruining many of the smaller companies, the resulting saving to the farmer from a general reduction in telephone rates would not make much appreciable difference to him. A percentage cut in the price of farm supplies and equipment would help him far more, but nobody seems to suggest it. A cut in the farmers' taxes would help a great deal, too.

In fact, that would help about everybody."

It is difficult to understand the logic that, because rural telephone companies have had a hard struggle to get along in the past, it would be quite all right to cut them down still more to help the farmer at this time. Because they have grown used to meager rations is no reason for reducing their revenue still further.

As the telephone is recognized as one of the farmer's greatest and cheapest conveniences it deserves adequate support—not less support. The better-informed rate commissions know this to be true.

An Important Decision.

Telephone men will attach considerable importance to the decision of the Massachusetts Supreme Court that a telephone company is not bound to transmit a message for a subscriber, even in the emergency of reporting a fire. In the case in question the telephone operator had refused to summon the fire department without authority from an official of another town in which the fire was located.

The court held that the company is not a common carrier in the sense that it is entrusted with the custody of anything of intrinsic value, and that it does not take possession of messages to be sent over its wires, as does a telegraph company.

While the telephone company puts its instruments in the premises of its subscribers, and engages to render service for a stated time at a stated compensation, its agents do not undertake to receive and transmit messages by their own voices to others. The telegraph company, on the other hand, commonly makes a separate contract for each message accepted for transmission.

While the court held that the refusal of the operator to connect a third party with the fire department in an adjoining municipality may have been a breach of duty to such party, this did not afford a cause of action to the party damaged by the non-arrival of the firemen.

* * * *

"There is no basis in this record," said the court, "for any understanding that the telephone was deemed to be for the protection of the neighborhood, with the consequent liability on the part of the company to all neighbors."

It is needless to state, that 99 times out of 100 the telephone company is able and willing to summon help in times of emergency. The Massachusetts case involved unusual circumstances of which the court was impelled to take proper cognizance.

COMING CONVENTIONS.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 20, 21, 22 and 23.

Independent Pioneer Telephone Association of United States, Hotel Stevens, Chicago, Thursday, October 22.

Missouri Telephone Association, Hotel President, Kansas City, November 11 and 12.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, November 18 and 19.

Nebraska Telephone Association, Hotel Paxton, Omaha, February 9, 10 and 11, 1932.

Change; the Great Competitor of Industry

Progress of a Nation Dependent Upon State of Mind of Its People—Telephone Employes Should Make Others Feel Their Pride in the Variety of Services Offered—Address Before Traffic Conference at Convention of Iowa Association

By Mrs. Mayme Workman,

Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

The word "servant" is fast disappearing from the world vocabulary, and the word "service" is coming into greater prominence every day. Service is a word that should imply any work performed for the benefit of all concerned. Employes are workers and sellers of service. Employes who regard themselves as important to the industry, and strive to make the business more successful, soon become worth more to themselves and to others. Work well done is what determines results and this is "service."

We are all selling some kind of service. We may teach, preach, discount notes, watch for fires, wait on tables, shovel coal, collect tickets, shave whiskers or operate switchboards. It is all service of some kind we are selling.

What is telephone service and whom do we serve? Little Johnny asked his teacher how you would classify a telephone operator. Is hers a business or a profession? The teacher replied; "It is neither, Johnny. It is a 'calling.'" This is quite true. There is a great deal of calling connected with our business—calling in, calling out, and occasionally "calling down."

Our service covers a wide field. We serve all nations and nationalities: Americans, Armenians, Hindoos, Jews, Italians, Germans, Irish, Japanese and Chinese and others. Occasionally we have a customer who is hard to understand due to his foreign accent.

For quite a number of years the traffic department's responsibility has been in "rendering satisfactory service to telephone subscribers." Today our responsibility does not end here. We must go a step farther and take an active interest in selling our service. This additional responsibility is due to "change, the great competitor."

America is a nation definitely on the move. The business that says, "I do not choose to change," is a bad risk.

The American people have a new attitude toward life and the apparatus with which life is lived. That state of mind greatly affects the things they buy and consume. Its expression has been aptly labeled "the American tempo." Every industry must be synchronized with the pace of today if it is to keep the pace of tomorrow.

In 1876, when Alexander Graham Bell received his original patent for an instrument to transmit voice by wire, telephones were considered as playthings, and during that year only 2,593 telephones were installed in the whole world. Today, in this country alone, there are now more than 20,000,000 telephones.

About the time the people became educated to the value of telephone service along came the radio and the people jumped at it—bought a million sets the first year. Why? Because they are a different people, more progressive in their modes of life. And largely for that state of mind we have the telephone to thank.

The telephone has upset the calendar. Now, over a circuit 14,000 miles long, we may speak on one day to a friend in Australia the next day, because if it is night time for us, it will be the following morning for him. Time in the United States and Australia differs about 15 hours.

This is but one of the many telephone paradoxes. So far as transmission of messages is concerned, the telephone has entirely eliminated both time and space. It has brought all the major countries of the world within speaking distance. It has conquered the obstacles of mountains, oceans and deserts that not so many years ago made it a matter of months for the

sending of a letter to someone a few thousand miles away.

Compared to the achievements of the telephone, "Aladdin's Magic Lamp" is but a trivial parlor trick. It is a monument to private initiative, enterprise and ambition.

Editor Albert Shaw of the "Review of Reviews" magazine says: "No other service of any kind in the world gives so much human satisfaction and so much sheer monetary value for the amount paid by the user as the telephone."

There is no single public convenience in America that affords so much help in emergencies and saves so much time and trouble in the ordinary course of life as the "nickel-in-the-slot" telephones that one finds by the million throughout America.

This service is enjoyed by rich and poor alike. Nothing else is purchasable for five cents that can for a moment be compared in value of the intrinsic sort, with this five-cent telephone service.

It has only been in the last few years that telephone companies have considered it necessary to advertise their product. "Change, the great competitor," has given us all a jolt, and the past year has brought us to the realization that if we wish to increase our business we must make an earnest effort to compete for the great American dollar. There are just so many dollars spent in our country each year, and it is entirely up to us as to what amount of these dollars we receive.

J. H. Mathews, chief engineer of the Illinois Commerce Commission, in an address before the Illinois Telephone Association last November on the "Indispensability of Telephone Service," gave some interesting figures on the cost and upkeep of an average automobile per average month. I found these figures quite interesting compared to the cost of telephone service. Here are his figures:

Gas	$12.00
Oil	2.02
Tires and tubes	5.87
Maintenance	15.80
Depreciation	12.75
License	1.25
Garage	4.00
Interest at 6 per cent	3.30
Insurance (fire, theft, tornado)	1.93
Total	$58.95

He also stated that an average subscriber, at your age or mine, at rates now in effect in rural and small urban areas, could probably rent telephone service for the entire balance of his remaining useful life for what it would cost him to run the average automobile eight months.

In the past we have been entirely too modest in regard to what we have to sell. In conversation with the average automobile salesman, regardless of what the topic of conversation may be, it will only be a short time until he will be telling you all about the new model and the fine points of his car, its speed, the new and improved features.

How many telephone operators do we find telling their friends and acquaintances about what we have to sell; our new equipment and improvements in operating methods, speed of service and reduced rates in station-to-station calls?

There are thousands of people today who have never heard about the CLR or non-hang-up method of toll service in the cost not familiar with the difference in the cost of person-to-person and station-to-station service and the reduced rates in effect on station-to-station calls during the evening and night periods. Why? Because we have

"Change and Competition March Down Main Street As One," Says Mrs. Workman. "If Our Operating Methods, Equipment and Sales Methods Are Good Today, They Must Be Better Tomorrow. There Is No Standing Still in This Progressive Age."

failed to "blow our own horn." Operators in their contacts with customers, friends and acquaintances have a wonderful opportunity to advertise the company's service and policies.

Our pride should encourage us to talk about our service, for as has been previously stated, no industry has as much to offer for the same amount of money as the telephone industry. And if we wish to take another view of the subject, it is true that the more our telephone users know about the service and operating methods, the easier it is for us to serve them. And let us not forget, every new customer added to our list of subscribers is making our position with the company more secure.

Many companies have conducted sales campaigns during the past year and the traffic department has made a fine showing in every case. A sales campaign conducted in a town in Illinois with a population of less than 5,000 added 47 subscribers to the company's list, mostly through the efforts of the traffic department.

We are living in an era of constant change in every industry and every walk of life. Today we have self-starting and self-leveling elevators, street cars with automotive brakes, airplanes directed by radio and hauling passengers, express and mail night and day, and ships driven by electricity. Broadcasting is now a national institution—the photoplay, talking pictures, with television on the way.

Chemistry has added to our vocabulary such words as celotex, cellophane, celanese, rayon, velox, duco and pyrex, while science gave us mechanical refrigeration, oil-heat, frozen foods and the automatic stoker.

We have colored kitchens and kitchen utensils, which is quite a change from grandmother's cedar bucket and polished tinware. We have bathrooms in various shades and colors, and in some of the wealthier homes we find tubs and fixtures of gold.

Automobiles are constantly changing colors and models in order to keep up with the march of progress. Automobile dealers started out by trying to sell one car to each family. When they thought they had approached the point of saturation, someone conceived the idea of selling a car to individual members of the family. The head of the household soon appreciated the idea of having the use of the car every night instead of those nights when son and daughter "did not choose to drive." At the present time it is not uncommon to have three or four cars in one family.

In the telephone industry we now have colored handsets and we are beginning to realize the importance of comfort and convenience as selling points in advocating a telephone for the living room, bedroom and kitchen.

One prominent telephone man in Illinois has eight telephones in a seven-room home. I was told that he formerly had one telephone in the living room. Every time the telephone would ring, he and his wife would look at each other to see who was going to get up and answer the call, so now each has a telephone at their favorite chair. No doubt it is an easy matter for this telephone man to advocate the use of extension telephone service, as he is in a position to realize all of the comfort this service affords.

Even greater changes may be expected in the years ahead. Already in 1931, some 600 new processes in production have been announced. In one week 3,174 patents were issued—four times the normal number.

Telephone service rendered a few years ago would not be satisfactory today. Change and competition march down Main street as one. If our operating methods, equipment and sales methods are good today, they must be better tomorrow. There is no standing still in this progressive age. He who hesitates to adopt new methods and to keep in step with the march of progress is rapidly becoming lost.

In conclusion, let us do our bit toward increasing our business by rendering a high grade of service, advocating the company's policies and adopting new standard practices as we receive them, not only for the company's interest but for our own welfare as well.

Radiotelephone Service Between South Africa and Great Britain.

According to an announcement of the minister of posts, arrangements have been completed for a commercial radiotelephone service between the Union of South Africa and Great Britain. The service at the South African end will be provided at Capetown by the Imperial Communications Co. and will be available to telephone subscribers within a radius of 300 miles of that town.

The government has reserved the right to terminate the service through the Communications company at any time, and to erect its own transmitting and receiving radiotelephone station near Johannesburg.

What Operators Want to Know

Value of Giving Instructions Tactfully—Cooperation Necessary Between Toll Center and Tributary Chief Operator—Finesse Finds a Way Without "Spilling the Beans"—Questions of Week

By Mrs. Mayme Workman,
Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

Question No. 5, "Is the toll center chief operator over the tributary chief operator?" gives us food for thought. My first reaction to the question was, "What has happened to cause the tributary chief operator to feel that the toll center chief operator is over her?" The answer probably is that someone failed to finesse.

Finesse is not a common word, and it has an uncommon meaning. It is the refinement of drawing distinctions, and the delicacy of mental action. It is clearness, sometimes cunning, but always stratagem. Finesse finds a way without "spilling the beans."

It has been my experience that the toll center chief operator is very anxious to assist the tributary chief operator in every way possible, as she is responsible for the service rendered to tributary subscribers on all calls handled at her office.

The toll center chief operator appreciates any report made regarding unsatisfactory service received from her office, not because she is pleased to hear about this unsatisfactory service, but because this knowledge enables her to take the necessary steps to correct the unsatisfactory condition revealed by the report.

The toll center and tributary chief operator should work in closest harmony. Where this cooperation is lacking, who pays? Everybody pays! Customers pay, employes pay, and certainly the company must pay.

The toll center chief operator is not over the tributary chief operator, but she can help you over many rough spots if you will call on her. My advice to tributary chief operators is to take advantage of this assistance.

And to the toll center chief operators: Lend a helping hand to your tributary chief operators. Remember, cooperation is nothing more than the concentrated essence of that good, old-fashioned custom of being neighborly. Show the other fellow that spirit of kindliness, friendliness and helpfulness, and you will be sure to gain his cooperation.

Questions from Illinois Operators.

1. What report do you enter on the ticket when the call has been held over a day and you call the subscriber and ask if the call can be tried?
2. How do you compare a person-to-person call and a station-to-station call in rating?
3. If the subscriber is calling a long distance call and the circuits are busy, is it necessary to have him on the line when you make the second attempt or can we get his party and call him back?
4. On a built-up circuit, how far does the originating operator clear, to the first or distant point?
5. Is the toll center chief operator over the tributary chief operator?

For answers to these questions from real Illinois operators, turn to page 30.

ORDER 00261

By Miss Anne Barnes,
Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

If "order is heaven's first law"—and we can well believe it is, when we consider how surely everything is in its place at the appointed time; how one season follows another in natural sequence, etc.—then surely we mortals should order our lives better. It is indeed more than a man-sized job to keep everything in this universe day after day, season after season, and year after year, just *what* and *where* it should be, *when* it should be.

If everything were not so well organized from the very largest and most important down to the smallest, how disturbed and unsafe all humanity would feel, even over very little things such as the morning glories failing to open when they should or close at their proper time.

"I must go out and look at the morning glories," I remarked daily to my sisters this past summer, never doubting, of course, that they would be hanging there in all their riotous beauty and color.

Isn't it strange that so few people are really systematic when they live under the constant influence of such flawless order?

Recently I broke a lens of my glasses. This would not have happened if I had always placed them upon removing them in the case as I did when they were new. When I called at the optician's for a fitting, I was greatly impressed with the system of that office.

The attendant brought the new lens in a tiny drawer from a large cabinet. Underneath the lens lay the doctor's order. How carefully they protected that lens from scratches, misplacing, or mixing with other orders. They grind hundreds of lenses daily there.

"What might happen if they ever got the lenses mixed? Not likely in such an office as this," I mentally commented. But what if the attendant had fumbled around here and there and finally asked, "Where did you put Order 00261?"

"Why, isn't it in the cabinet by the window?" etc., etc.

Such things make one apprehensive. I would have thought many things and not one would have been complimentary to that concern, no matter how shiny its desk tops were.

Moral: "If every worker, whether he be in the ranks or in a supervisory capacity, knows exactly what he is expected to do and feels an individual responsibility for it and pride in it, a long step toward perfect organization, which develops good will, has been effected."—Andrew W. Robertson.

Prices in the Metal Markets.

New York, October 5.—Copper—Quiet. Electrolytic, spot and future, 7.00c. Tin—Steady; spot and nearby, $22.50; future, $22.85. Lead—Easy. Spot New York, 4.00; East St. Louis, 3.82c. Zinc—Steady; East St. Louis spot and future, 3.60c.

Testing With Rectifier Type Meters

Newly-Developed Meters Make Transmission Testing Reliable, Simple and Inexpensive—Theory and Method of Operation—Determination of Equipment Losses, Circuit Impedance, and Transmission Efficiency in Subscribers' Sets

By B. C. Burden,

Transmission Engineer, Lincoln Telephone & Telegraph Co., Lincoln, Neb.

Radio has brought numerous new inventions into fields having no direct connection with the radio industry. An example of this is the new rectifier type meters recently introduced. While designed primarily

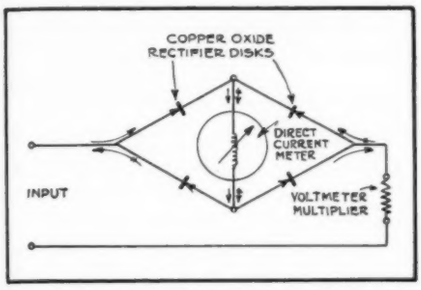


Fig. 1. Circuit Showing Essentials of a Rectifier Type Voltmeter.

to measure radio set output, and for checking vacuum tube gain, these meters should prove of exceptional interest to the telephone field, as they represent a long-felt need for an instrument which would give the small company a practical method for making transmission measurements of circuits and equipment.

Every Independent telephone company should investigate the uses of these instruments in telephone plant testing. This article describes the theory of these meters and their application in telephone plant testing.

Theory of Rectifier Meters.

Rectifier type instruments consist essentially of a copper-oxide rectifier and a sensitive direct current micro-ammeter arranged in a circuit as shown in Fig. 1. The copper-oxide disks are so arranged as to form a "bridge-type" full-wave rectifying circuit with the direct current meter connected to the mid-point of the bridge so that only the rectified direct current passes through it.

When this arrangement is connected in an alternating current circuit the alternating current potential or current may be determined from the deflection of the sensitive direct current meter, which is, of course, calibrated to indicate alternating current rather than direct current values.

The copper-oxide rectifier unit consists of disks coated with copper-oxide on one side, Fig. 2. These disks have the property of allowing current to pass from the copper-oxide to the copper, but not from copper to copper-oxide. Obviously this property permits such units being used as half-wave rectifiers.

The rectifying action of the copper-oxide rectifier is, as far as can be determined, entirely electronic; and inasmuch as no chemical reactions take place, such a rectifier will operate indefinitely without failure.

The copper-oxide rectifying elements used in the new rectifier type meters are sufficiently small to permit mounting in the ordinary 3¼-inch meter case. The meter shown in Fig. 3 is a Weston 0 to 3-volt meter with both rectifier and multiplying resistances within the case.

Features of Rectifier Type Meters.

The two outstanding features of rectifier type meters which should interest every telephone man is the fact that voice frequency voltages can be measured and that these instruments are both rugged and relatively cheap.

Prior to the appearance of these meters

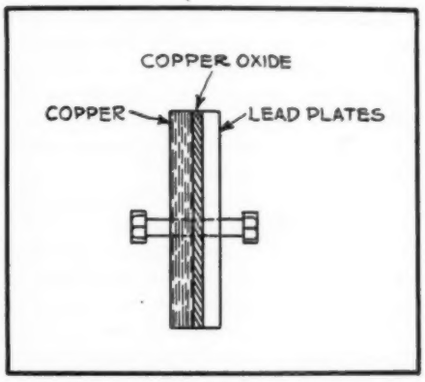


Fig. 2. Details of Disks Essential in Rectifier Type Meter.

the only available method for making transmission tests on telephone lines by voltage measurements was by means of the vacuum tube voltmeter or the thermo couple and direct current micro-ammeter method. Both of these methods required relatively cumbersome and expensive instruments which would be easily damaged by overloads.

Rectifier type instruments, however, are small enough to be carried in the coat pocket and are but little more costly than ordinary type direct current meters.

There are several sources of error which are inherent to these meters. While these are not sufficiently important to hamper the meter's usefulness, it is advisable to be familiar with such factors as would tend to give a reading slightly in error. The factors which affect the accuracy of rectifier type meters are, in the order of their importance: Wave form, frequency, resistance characteristic of copper-oxide rectifier, and temperature.

Errors due to wave form may occur where other than sine waves are measured. The reason for this is the fact that the meter deflection is proportioned to the average value of the rectified wave, but the meter is calibrated in terms of root mean square values. The magnitude of errors from this source depends on the amplitude and phase displacement of the harmonics present in the source being measured. This source of error is not of consequence in the transmission measurements described in this article.

Errors due to frequency result from the fact that the instrument deflections decrease for a given voltage, as the frequency increases. For frequencies above 1,000 cycles up to 35,000 cycles the actual reading should be corrected by a factor of 0.5 per cent for each 1,000 cycles.

Errors due to the resistance characteristics of the copper-oxide rectifier may result from the fact that the resistance of these rectifying units depends on the current flowing through them, and decreases as the current flow increases. This variation in resistance is calibrated into the scale of voltmeters, and results in no error so far as instrument indications are concerned.

The fact that the resistance varies with the deflection of the meter is of no serious consequence except where a fairly low resistance meter might be used on a high resistance circuit. For radio and telephone work the recommended voltmeter has a resistance of approximately 4,000 ohms which is sufficiently high to prevent appre-

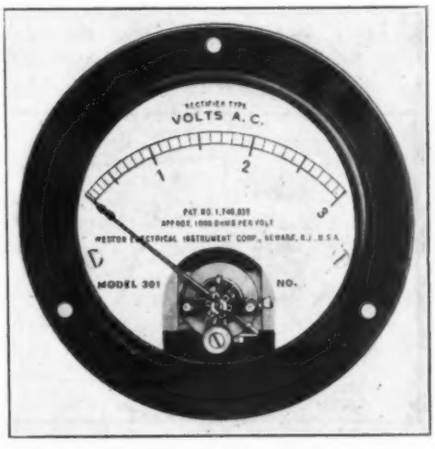


Fig. 3. A Small Panel-Mounting Rectifier Type Alternating Current Voltmeter.

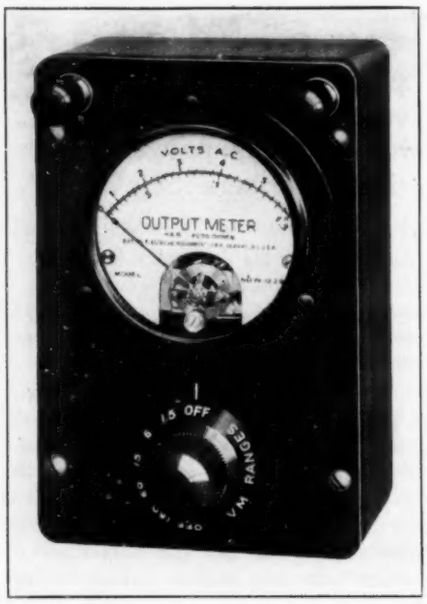


Fig. 4. Another Rectifier Type Voltmeter Well Adapted to Telephone Testing.

ciable errors due to the changing resistance.

This variation in resistance as well as the magnitude of the full scale resistance does materially handicap the usefulness of the rectifier type milliammeters in telephone circuit testing. For example, the 0 to 2 milliampere meter has a resistance variation of from 180 ohms at full scale to approximately 325 ohms at 0.3 scale. Obviously such a meter could only be used in a circuit having an impedance of several thousand ohms, if error was to be avoided.

Errors due to temperature result from changes in the rectifying properties of the copper-oxide rectifier as the room temperature varies. These errors are small over a temperature range of 64 degrees to 86 degrees Fahr., and for all practical purposes need not be considered.

The foregoing paragraphs which discussed the possible source of errors that may occur in the use of rectifier type instruments are not intended to imply that such meters are not accurate, but rather to acquaint the reader with their operating characteristics so that they will be properly used. Under ordinary use the total error from all the sources mentioned will seldom exceed a few per cent.

Rectifier type meters are available in voltmeters, milliammeters and microammeters. The voltmeters can be obtained with resistances of from 1,000 to 2,000 ohms per volt, while the resistances of the micro-ammeters and milliammeters will depend on the range, being higher with the lower current ratings. It should be noted that the resistance in ohms per volt is generally based on the resistances at full scale, and will be higher than this value at less than full scale deflection.

Fig. 3 shows a panel-mounting 0-3 rectifier type voltmeter, and Fig. 4 a special model multi-range voltmeter, both Weston instruments.

Application of Voltmeters.

One of the principal applications of the rectifier type voltmeter is its use in the measurement of line and equipment losses. Prior to its introduction to the telephone field the only practical means of determining line loss in terms of decibels was by the use of "ear balance" transmission measuring sets, or complicated vacuum tube visual measuring sets.

One method of measuring circuit loss is shown in Fig. 5. The method consists of connecting a General Radio 1,000-cycle oscillator, having an internal impedance of approximately 600 ohms, to the line to be tested. The voltage input to the line from the oscillator is measured. Then if the voltage across the circuit at any point is measured, the circuit loss to that point in decibels can be easily determined from a table of voltage ratios.

It will be noted, Fig. 5, that it is necessary to connect a 600-ohm resistance across the multi-range meter terminals so that the line will be terminated in an impedance equivalent to that of the oscillator.

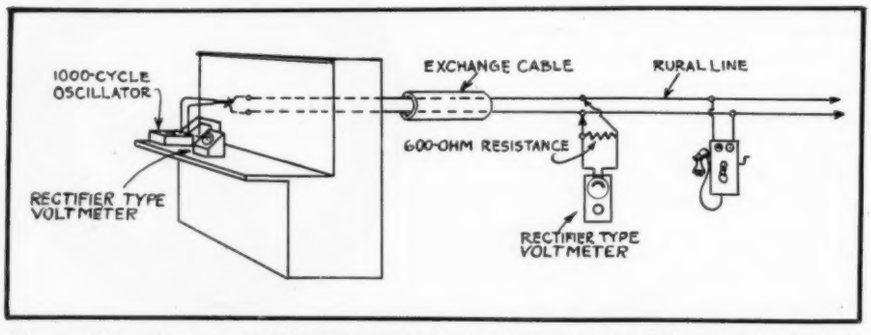


Fig. 5. Connections for Making Transmission Measurements to Determine the Loss in a Telephone Line Using a Rectifier Type Voltmeter and a 1,000-Cycle Oscillator.

By equipping the oscillator with a plug and cord terminated at the switchboard, it can be plugged in the line to be tested by the operator when the tester out on the line is ready to make a test. It is, of course, necessary to have two voltmeters so that the operator or wire chief can read the output voltage.

Items.	Loss in db at 1000 cycles.
No. 12 iron wire (metallic circuit)	0.30 per mile
No. 12 (.104) copper (metallic circuit)	0.068 per mile
No. 24 gauge cable	2.10 per mile
No. 22 gauge cable	1.75 per mile
No. 19 gauge cable	1.20 per mile
Modern repeating coil (side circuits)	0.70 per coil
Modern repeating coil (phantom circuit) two coils	0.25 per coil
Magneto cord circuits and central office loss	1.25 per circuit
Common battery cord circuits and central office loss	1.25 per circuit
Loss due to bridged 1600-ohm farm-line ringer	0.10 per ringer

Table No. 1. Transmission Losses of Telephone Lines and Equipment.

This method of measuring the transmission qualities of a circuit which takes into account all of the factors which cause loss and unlike circuit resistance measurements, tells the whole story. Slight errors are introduced due to the current taken by the meter, but for ordinary measurements these errors may be neglected.

The measured results in decibels should be compared to the expected loss to determine if the circuit has an excessive loss. It is customary to measure and express circuit and equipment loss in terms of its 1,000-cycle efficiency.

The range of the multi-range voltmeter when used with the oscillator is approximately 26 db., assuming an output of four volts from the oscillator to the line and a minimum reading of 0.2 volt.

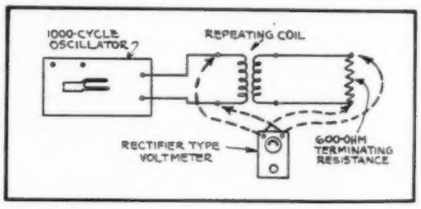


Fig. 6. Method of Measurement of Equipment Losses Using Voltmeter and Oscillator.

Equipment Loss Measurement.

The measurement of transmission losses of central office equipment and line repeating coils is an important feature of transmission maintenance. Central office equipment, being common to all lines, it is especially important that it be maintained at its highest efficiency.

Accurate measurements may be easily made by the method shown in Fig. 6. Here again it is necessary that the equipment be terminated in a resistance of approximately 600 ohms, so as to avoid what are known as "junction losses."

It will be noted that the method of measuring equipment losses is approximately the same as that for measuring circuit losses and consists in feeding 1,000-

cycle current into the equipment being tested and measuring the input and output voltages. Table No. 1 gives the normal losses of repeating coils, cord circuits, etc.

Old style repeating coils, reversed windings, low impedance drops, short-circuited turns, bad connections in keys, etc., are common sources of excessive transmission losses in central office equipment.

The method described is a sure means of showing up such conditions, and on the well-known theory that a "chain is no stronger than its weakest link," it is highly desirable to see that central office equipment is in first class condition.

In testing central office equipment a low input voltage from the oscillator should be used, as there is less tendency for bad contacts to "go good" with low voltages (approximately 0.5 to 1 volt).

Cord circuits can be quickly checked by means of the switching box shown in Fig. 7. The loss on one cord circuit is computed; if found to be normal, then the remaining cords may be quickly checked by plugging into the switching box and noting whether the output voltage is approximately the same for each cord.

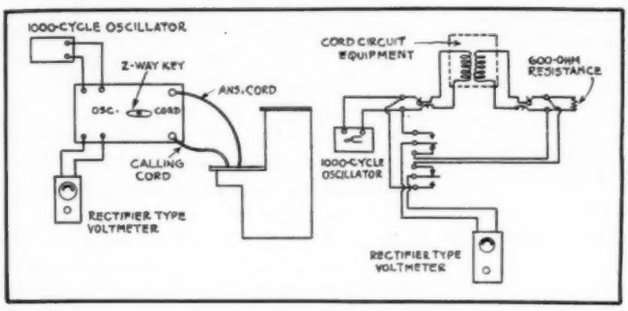


Fig. 7. Arrangement of Testing Instruments and Connections to Key for Quickly Checking Cord Circuit Losses.

The listening keys should be opened and closed gently to detect poor contacts.

Instrument Repair.

Another of the many uses for which the rectifier type meter is adapted is for making voice tests of the transmitting efficiency of subscriber sets. As previously explained, this type meter will measure frequencies within the average voice range of 200 to 2,500 ohms with but little error.

It may, therefore, be used as a power level indicator by connecting it directly across the terminals of the telephone being tested and a 600-ohm resistance as shown in Fig. 8. An approximate idea of the transmitting efficiency of the subscriber set under test is then obtained by repeating a test word into the transmitter at a normal voice level.

By knowledge of the deflections obtained on a first class set the efficiency may be gauged. For example, a new W. E. magneto desk set with a No. 337 transmitter and two dry cells, and with 600 ohms connected across the line terminals, will give a reading of approximately 1.3 volts on the multi-range voltmeter scale when the word "hello" is spoken into the transmitter in a normal tone.

It should be appreciated that talking tests of this type cannot definitely be given in terms of the db. unit. However, they will prove of considerable help in locating poor transmission faults on local battery sets which would ordinarily be overlooked.

Impedance Measurements.

One of the basic laws governing transmission losses states that for a receiving device to take maximum power from current sources, the impedance of the receiving device must be equal to that of the generator or lines from which current is being taken. An attempt is, therefore, made in all telephone circuit and equipment design to see that the impedance of the various items connected together have approximately equal impedances. The telephone man who is fairly familiar with transmission theory often wishes to determine the impedance of some piece of telephone equipment. Impedance measurements are usually made with an impedance bridge which is quite expensive and more or less difficult to use.

Using the rectifier type voltmeter, a 1,000-ohm oscillator and a variable resistance, the impedance of any piece of telephone equipment can be readily determined by the method shown in Fig. 9.

The method is very simple and consists in passing 1,000-cycle current from the oscillator through the variable resistance and impedance to be measured in series. The resistance is then varied until the same voltage is read across the impedance as across the resistance. The impedance under this condition is equal to the resistance (approximately).

If a variable resistance of the proper range is not available, a fixed resistance can be used and the impedance of the item under test determined by the following formula:

$$Z = E_z : E_r :: X : R \quad \text{or}$$

$$Z = \frac{E_z R}{E_r}$$

In this, Z is the impedance in ohms of the item being measured; E_z, the voltage across the unknown impedance; E_r, the voltage across the resistance; and R, the fixed resistance in ohms.

This method of measuring impedance is based on the fact that in a series circuit, the voltage drop across an impedance is directly proportional to the magnitude of the impedance in ohms. Inasmuch as the current is the same at all points in a series circuit, the drop of potential across two impedances, if one is known, may be used to determine the unknown impedance. Some errors are introduced by the fact that the meter resistance is not infinite.

The characteristic impedances of various pieces of telephone equipment are given in Table No. 2.

Items.	Impedance (1000 cycles).
Magneto subscriber sets	650 ohms
Common battery subscriber sets (booster type)	500 ohms
Receivers	250 ohms
Ringers (1,000 ohms)	30,000 ohms
Ringers (3,500 ohms) special high impedance type	200,000 ohms

Table No. 2. Approximate Impedance of Telephone Equipment at 1,000 Cycles.

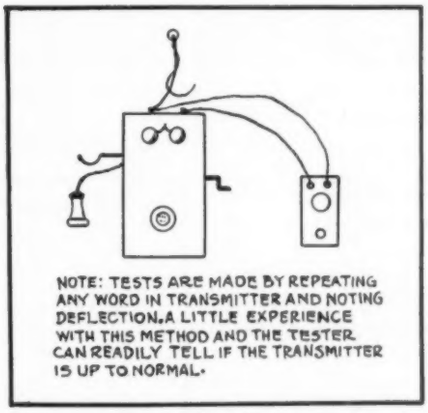

NOTE: TESTS ARE MADE BY REPEATING ANY WORD IN TRANSMITTER AND NOTING DEFLECTION. A LITTLE EXPERIENCE WITH THIS METHOD AND THE TESTER CAN READILY TELL IF THE TRANSMITTER IS UP TO NORMAL.

Fig. 8. Method of Checking Power Level of Transmitter.

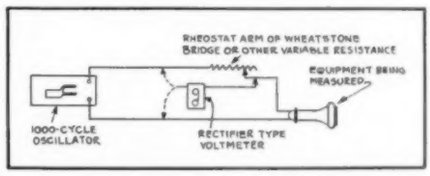

RHEOSTAT ARM OR WHEATSTONE BRIDGE OR OTHER VARIABLE RESISTANCE
EQUIPMENT BEING MEASURED
1000-CYCLE OSCILLATOR
RECTIFIER TYPE VOLTMETER

Fig. 9. Method of Measuring Impedance of Telephone Apparatus.

Miscellaneous Applications.

In addition to the applications already discussed there are many others which make the rectifier type voltmeter an indispensable testing instrument to the practical telephone man. Fig. 10 illustrates a few of them.

Some of these miscellaneous applications are:

1. They can be used for checking the output voltage of oscillators. This is often necessary when making tests where it is desired to maintain a constant oscillator output.

2. They can be used for checking the power output of radio sets.

3. The voltage gain of vacuum tubes used in radio frequency amplifiers can be measured.

4. In connection with small public address systems the meter makes an excellent volume indicator.

5. Being suitable for use on frequencies between 0 and several thousand cycles, it may be used to check the voltage output of magneto telephone generators and ringing machines.

6. This instrument may also be used for checking the voltage of 110-volt 60-cycle supply sources.

7. The capacity of condensers may be determined readily with the rectifier type voltmeter by means of the method shown in Fig. 9.

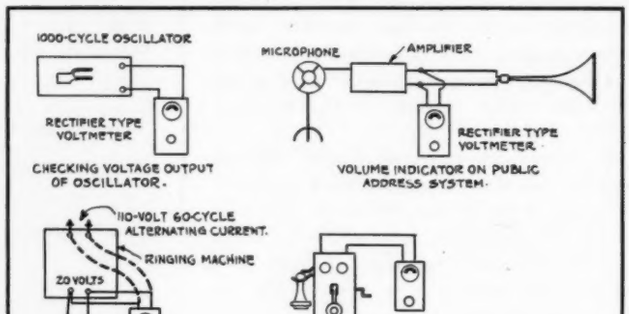


Fig. 10. Illustrations of a Few of the Additional Miscellaneous Applications of the Rectifier Type Voltmeter.

Conclusion.

The introduction to the field of rectifier type voltmeters gives the Independent telephone company a simple, inexpensive and reliable method of checking up on transmission.

There is no need for those not theoretically inclined to go deeper into the subject of "transmission theory" than to familiarize themselves with the unit of transmission (see Data Sheet of May 16, 1931, issue of TELEPHONY).

Millions of Miles of Wire Serve Nation's Telephones.

During the last five years the number of telephones in the United States has increased from 16,936,000 on January 1, 1926, to 20,201,000 on January 1, 1931, while the total miles of exchange wire have increased from 46,027,000 to 69,208,000.

Adding the miles of toll wire, there was at the beginning of the present year a total wire mileage of 83,110,000. The average number of daily conversations, including both exchange and toll, amounted to 67,300,000 for the year 1925, while for the year 1930 the corresponding figure was 83,520,000.

Five-Week Operators' Strike in Lima, Peru, Settled.

The Peruvian Telephone Co., Lima, Peru., and its employes have agreed to accept the arbitration of the municipality, ending the five-week strike on September 29.

The terms of the award state that operators will receive a minimum weekly salary and a six-hour day. The company has complete authority to dismiss its telephone employes in conformity with the law.

Method of Notifying Firemen

Simple Method by Which Firemen May Be Notified From the Small Office With Limited Equipment—Operator Is Able to Inform a Large Number of Firemen in a Short Interval of Time

By Geraldine Cleaver,
Chief Operator and Bookkeeper, West Iowa Telephone Co., Anita, Iowa

The proper method of handling a fire alarm in a small telephone office is indeed a problem. Mrs. Katherine White's article in the September 12 issue of TELEPHONY is very good. However, all offices do not have the fire equipment she speaks of, and for the offices that do not have this equipment I would like to pass on a method which we have found most satisfactory in our office.

Many methods of giving, or trying to give, service at the time of a fire have been tried. It seemed as though no matter how hard the girls tried they were unable to successfully handle the business during a fire. So often they are forced to try and please both the fire company and the curious subscriber and fail to please either. Finally the following method was suggested here a short time ago and after a fair trial has been giving wonderful satisfaction.

First of all, no matter how often subscribers are asked *not* to call in after a fire alarm has been given, there are some who will ring in anyway. Then, too, there is the rural subscriber who does not know there is a fire and will ring in as usual. Of course he just cannot be answered until after all calls pertaining to the fire have been taken care of. Because we answer no calls, the firemen are not supposed to ring in either but are notified as follows:

A list of the firemen, 30 in all, was handed in by the fire company. From this list four smaller lists were made, using the firemen's telephone numbers: One list for day and one for night; one list for those on the right-hand side of the switchboard and one for those on the left. These were pasted on the switchboard where the operators could readily see them.

Day Fire List. Right Side.		Night Fire List. Right Side.	
4	11	9	10
3	106	20	15
12	50	209	60

I made the two lists, one on the right side of switchboard and one on the left, for convenience when two girls are working. On the upper left-hand corner of the switchboard is an electric switch which rings the fire bell. The operator can reach it and pull the switch without getting up from her chair.

As soon as a fire alarm is given the operator, she reaches up and pulls the switch which rings the bell. Then she starts putting the plugs in the numbers listed for her. She uses both front and back connections, ringing as she puts each one in, leaves the keys open and keeps repeating the location of the fire.

For instance she will plug in on Nos. 4 and 11, ringing as she does so, leaving that key open; and as she plugs in and rings on Nos. 3 and 106 she will be saying where the fire is. She continues in this manner until all numbers have been put up. All keys are left open a reasonable length of time, while the operator continues giving the location of the fire.

The firemen have been instructed *not* to ring the operator and ask where the fire is as soon as they hear the bell, for at this time the operator is instructed to answer *no* number. She puts all of her attention on the giving of the report in this specified manner, and it takes just a very few seconds for this to be done.

Upon hearing the telephone ring, the firemen merely take down the receiver—they will hear the operator saying where the fire is located. If a fireman cannot get to his telephone right away, he will still hear her giving the fire report a few minutes later if he goes to the telephone, for she leaves all connections up and all keys open.

Since deciding upon this method of giving the fire report we have had several occasions to try it out. One fire a short time ago, which threatened to wipe out the main street including the telephone office, occurred at 9 p. m. The operator gave the report as instructed, paying no attention to any incoming calls until the firemen were all rung. The firemen were more than pleased at the way it was handled.

Building or Rebuilding the Underground

Steps Necessary in Building or Rebuilding of Medium-Sized Underground Telephone Plant—Engineering Plan First Essential—Method of Laying Larger and Smaller Cables—Location of Trouble—Suggestions for Preventing Trouble

By Robert B. Potts,
Assistant Engineer, Middle State Utilities Co., Plattsburg, Mo.

The first step in the process of building a telephone plant is the engineering. Very much unnecessary money has been spent by not having the proper engineering before ordering the material for building, and oftentimes much delay is encountered waiting for additional material after the job has been started.

A map of the city should be made in order to make a house count or, in other words, every house in the town should be spotted as to its location in the block and those having telephones should be indicated by a code. Then the sizes of the cable, the sizes of the terminals and the location of the terminals can be determined.

In laying out a cable plant the growth of a town should be very carefully studied so as to have the cables leading into the office large enough to take care of any ordinary growth. It is a very good plan to have 100 or 200 extra pairs leading as far as the first manhole. Next, several working maps should be made so that the foreman in charge, the cable splicer and the engineer may each have one.

First, we shall take up the laying of the cable. All cable of 100 pairs and over should be laid in conduit and an extra conduit should be laid in case of trouble or in case a larger cable should be needed at any time. When laying conduit it should be graded so as to drain itself. If it is possible the manholes should be drained also.

When cable is pulled into the conduit, every precaution should be taken not to scrape or scar the sheath as that tends to weaken it. No one should be allowed to handle cable that hasn't had experience. Plenty of end should be left on the cable at the manhole for the splicer and every end that is cut off should be sealed immediately, not with tape as some do but with a torch and by a man experienced with solder.

Next, we come to the smaller cables to be laid in compound. In digging the trench for compounded cable it should be about 26 to 30 inches deep. Troughs should be made of one by four lumber, nailing two together in a V shape. It is practical to have about 100 feet of such trough. Building paper is cut in about six-inch strips and laid in this trough. The cable should be perfectly cleaned so there is no dirt moisture or oil on the sheath, and then laid in the trough on the paper. The paper serves to hold the compound around the cable.

The compound should be heated as hot as possible without burning, before applying to the cable or it will not stick. The two essentials in compounding cables are to have the cable clean and to have the compound hot.

The compound can be applied with a water sprinkler can, using a spout without the sprinkler. One man should be in front of the man pouring the compound, raising the cable so the compound will get on the underneath side of the cable. It should then be left a few minutes to cool before laying in the trench.

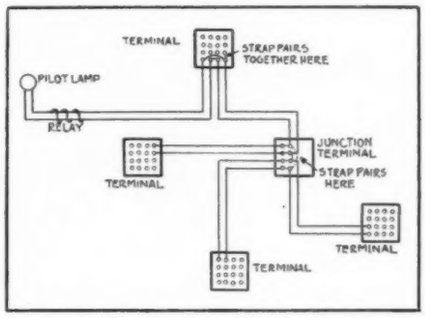


Diagram Showing Principle of the Extra Pair Only.

When cable is laid under or over or even near water pipes an iron guard should be clamped over the cable to protect it from other workmen. Another good idea, when filling the trench, is to fill within eight inches of the ground level, then pour a snake of air-slacked lime in the trench, then anyone digging can tell he is directly over a cable.

The telephone company can usually get the city council to pass an ordinance providing that anyone digging in the street must secure a permit from the city. The city council, in turn, consults the manager of the telephone company before issuing a permit. This will prevent many cases of trouble.

There should be a splicing box at each underground splice. This cement box, presumably two and one-half by four feet, can be moulded in a form, making two pieces of it; then it can be set in the ground and covered with a three-inch cover made in two pieces. The splices in 26 to 76-pr. cables at terminals should be made about two feet up the poles and covered with a sheet iron riser. This gives access to the splice for testing splices. Now we shall go back to the office and start with the splicer.

The splicer's first job is to put the wool cable on the rack; then he has something to work from. He proceeds to splice the large cables and continues on down to the smaller ones, cutting on terminals.

A plan has been worked out whereby one extra pair in each cable is used as a tell-tale or pilot pair. The pair comes in on the main frame and then goes to a very sensitive relay that operates a lamp as soon as any moisture shows up in the cable.

This extra pair is not bridged at the terminal splices, as ordinarily done, but is thrown up into the terminal on one pair and comes back down on another pair. Hence it is possible to open it in the terminal. It is normally kept bridged in the terminals, but in case of trouble the pair can be opened at each terminal until the trouble is located between two terminals. This is a great help in locating trouble.

When the cable splits and goes several ways, a junction box or a larger terminal than would usually be used is cut on and all the extra pairs bridged there. One can then eliminate any leg of the cable he wants to and find exactly which direction the trouble is and follow it out by opening the extra as shown in the accompanying diagram.

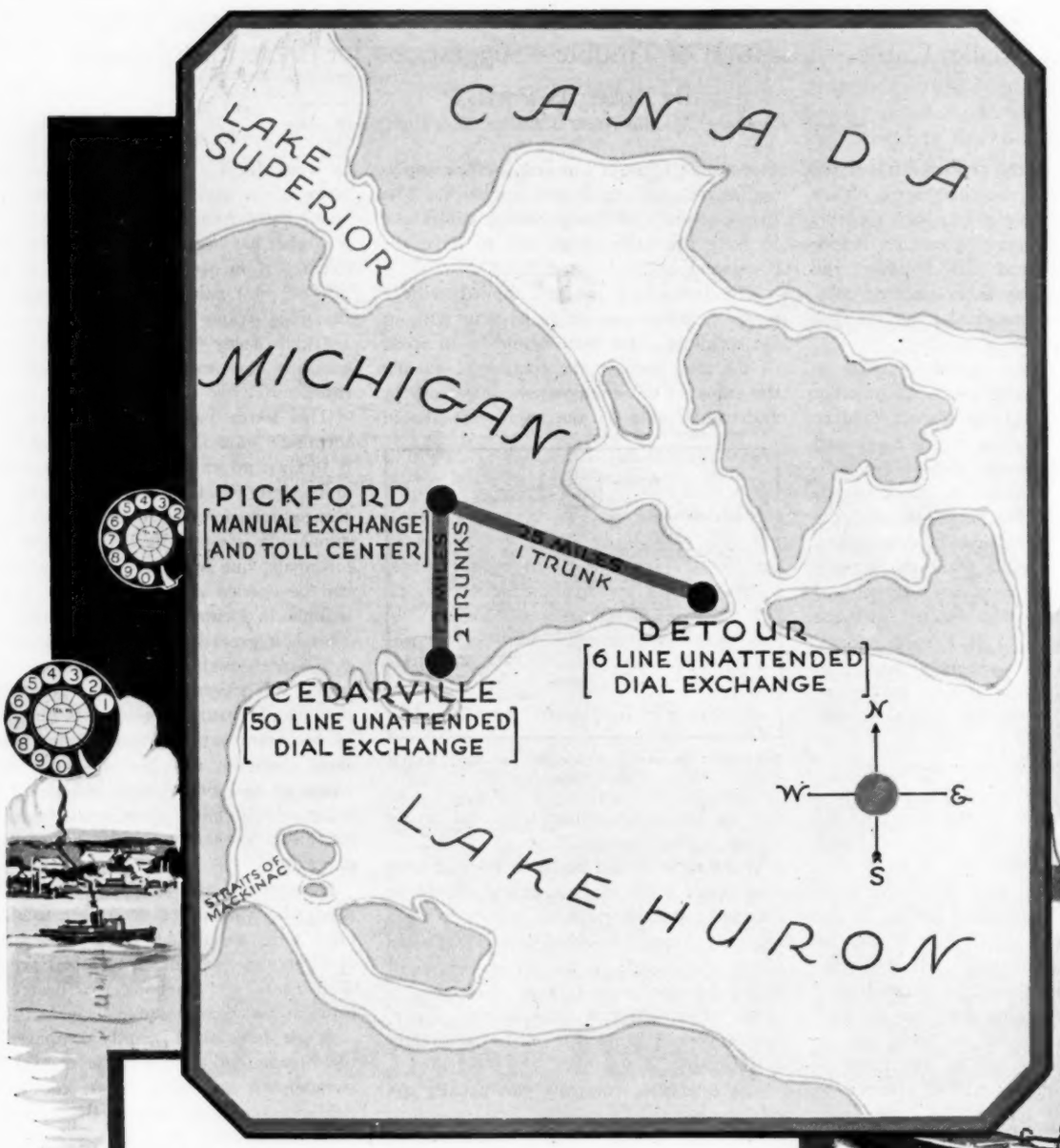
Unprotected terminals should only be used where insulated drops are used. All open wire should be taken into an arm arrester and then into a terminal protected with fuses and carbons, to protect the cable as much as possible.

A telephone plant is aptly compared with the human body. First, the central office switchboard and main frame compares to the brain or center of all, then comes the cable compared to the body or trunk. Then last come the drop lines and the rural lines, the limbs or branches. But when all is said and done the whole plant centers on the cables and switchboard. So the precaution that should be taken in installing this equipment can readily be appreciated.

England Begins Ship-to-Shore Service at Newport Docks.

A system of ship-to-shore telephony has been inaugurated at Newport Docks, England. Cables have been laid to the general cargo side of Newport Docks where nine plugging-in switches were installed.

The first calls over the system were put through from the Clan Line steamer "Clan Murray," to London, Glasgow, Liverpool and other ports. Arrangements for a similar telephone service are being made at Cardiff and Swansea, Wales.



Eve
Enjt

This interesting network of the Pickford Telephone Company proves that even the smallest and most isolated communities can enjoy the benefits of modern, twenty-four hour dial service.

STROWGER AUTOMATIC DIAL SYSTEMS

GENERAL EXPORT DISTRIBUTOR
The Automatic Electric Company, Ltd., Chicago, U. S. A. and Antwerp, Bel
In Canada · Independent Sales and Engineering Co., Ltd., Vancou
In Australasia · Automatic Telephones Ltd., Sydney
In Japan · Automatic Telephones Ltd. of Japan, Tokyo
In China · Automatic Telephones of China Federal Inc., U. S. A.
In South Africa · Automatic Telephones (South Africa) Ltd., Johannes

ve Smallest Exchange Can nj trowger Automatic Service

THE Strowger Automatic Dial network shown in the accompanying map provides a typical example of the flexibility of this equipment. It shows how even the smallest communities can be furnished the finest twenty-four hour service—on a practical, profitable basis.

In this network of the Pickford Telephone Company, the small town of Detour is located 25 miles from the toll center of Pickford. Its small number of telephones would not justify full, twenty-four hour service under ordinary methods of operation—in fact, this would be economically impracticable.

With Strowger Automatic Dial operation, however, the finest modern service is being furnished Detour subscribers every hour of the day and night. Local battery operation has been retained, in many cases dials merely being mounted on the existing instruments. The exchange unit is entirely unattended, toll and information calls being handled at Pickford.

Such ready application of Strowger Automatic Dial operation to even the smallest exchanges is rapidly changing the whole picture of small exchange operation. Where formerly they were financially dependent upon the larger exchanges, small communities can now be made not only self-supporting, but definitely profitable. Send for Bulletin 1551, describing Strowger small unattended units in detail.

This is one of a series of advertisements illustrating the application of Strowger Automatic Dial operation to telephone exchange networks.

Automatic Electric Inc.

Manufacturers of
Strowger Automatic Dial Telephone and Signaling Systems
Factory and General Offices: 1033 West Van Buren St., Chicago, U. S. A.

ASSOCIATED COMPANIES
American Electric Company, Inc., Chicago
International Automatic Telephone Co., Ltd., London
Automatic Telephone Manufacturing Co., Ltd., Liverpool
The New Antwerp Telephone and Electrical Works, Antwerp
Eugene F. Phillips Electrical Works Limited, Montreal

Why Telephone Service Costs Remain Up

Special Bulletin Sent Out by Nebraska Telephone Association to Members Discusses Five Classifications of Service Costs, Operation, Maintenance, Depreciation, Taxes and Interest Charges—Present Rates Unaffected by Changes

The Nebraska Telephone Association is sending out special bulletins to members which contain memoranda prepared for use to answer patrons and others who may ask questions regarding the effect of declining commodity prices on the cost of providing telephone service. The general public is not advised of the fact that most of the factors that make up the cost of telephone service are not responsive to the influences which cause costs and prices in the commodity world to fluctuate sharply. At the present time especially they are critical of the telephone companies because they do not reduce rates.

The bulletin points out that the cost of providing telephone service may be included under five classifications: Operation, maintenance, depreciation, taxes and interest charges. Operation includes such items as business service, selling, collecting, making and discontinuing connections with the central office equipment, accounting and management.

The principal item is labor. Usually the scale paid is that which will attract and retain the type of persons who will cooperate in giving efficient and economical service. This means meeting conditions as they exist in each community. Loss of efficiency through failure to follow a constructive wage practice means less satisfactory service and in the long run a higher over-all operating cost.

Sixty cents of the telephone dollar are paid for wages, and there has been no general reduction in these. Operation costs per station have tended to increase under the stimulus of more exacting demands for service and the desire to provide speedier and more accurate handling of calls. Taxes of telephone companies have increased with other taxes.

In the cost of maintenance the largest item is also labor. Materials used in adjustments and repairs are a very small part of telephone expense, averaging less than a cent and a half of the telephone dollar. While there have been some reductions in the price of the raw materials used, there has been little change in the cost of the manufactured products. In any event the cost of these is so small that price fluctuations would have only a negligible effect.

Maintenance costs are higher than before because of the use of new and improved types of apparatus used in bettering transmission which require more attention, rearrangements in lines due to public requirements and road construction activities, and the improved speed in restoring service after storms and other casualties.

The depreciation rate charged as a part of telephone service costs has been arrived at after many years of experience during which accurate records have been kept of the service life of the various units that make up a plant. It represents the average amount of property used up per year in furnishing service, and is just as much of an expense as are wages and taxes. To meet this expense, charges are made currently against earnings to provide an amount equal, on the average, to the cost of the property consumed.

Depreciation charges are related closely to the investment in plant. This investment per station has been growing because past replacements have been of materials that cost more than did the material replaced as did the labor involved; because of longer average subscribers' lines due to the spreading out of population, and better equipment furnished at the central office as well as for the subscriber's use.

The larger the exchange the greater the investment in plant and equipment per telephone because of the necessity of providing central office equipment to connect each station with very other station.

Attention is also called to the fact that even if there had been considerable reduction in material prices it would not appreciably affect the plant or depreciation expense, replacements or additions each year being so small a percentage of the total investment that it would require a considerable variation in prices over a considerable period to materially affect the annual depreciation expense.

While better types of plant equipment have been introduced, this tendency toward reduced depreciation cost has been balanced by public requirements, road construction and the like. The net result of increased investment per station and a slight decrease in the average depreciation rate is an increase in the annual depreciation expense per telephone.

VALUE.

A telephone instrument on your desk is of no value if nobody else has one. But place telephones in the offices of a thousand other business men and connect them by a central switchboard, and the value of your telephone is at once apparent.

As the number of telephone users increases, the value of your own telephone increases because the number of possible contacts is increased.—American Institute of Banking News.

It is suggested that subscribers' attention be directed, when necessary, to the fact that the companies make periodical reports to the Interstate Commerce and state commissions, which is a complete answer to the question sometimes raised whether the investment accounts reflect actual costs.

With respect to interest charges, it is necessary to earn on the investment such an amount as will keep the business on a financially sound basis and attract whatever money is needed for growth and improvement. To get this money the company must go into the open market, where the lender, not the borrower, sets the price.

Charges for telephone service have never been more than necessary to pay expenses and other charges. Telephone companies have not increased rates when other commodity prices were high, and they cannot cut them down when these decrease.

Of the five items of expense, three—depreciation, taxes and interest—are very slowly responsive to those influences which cause general commodity prices to fluctuate.

Investment in plant is influenced to a large extent by the service demands. To provide satisfactory service it is necessary to have enough plant and equipment to give service at the peak time of requirements. When business falls off at the time of a general depression, it is not practical to remove most of the plant not used. Hence, depreciation, taxes and interest charges and like costs continue on plant which is not earning.

The degree to which operation and maintenance expenses have been lowered through sound management control since the recession of business set in has been sufficient only to offset the amount by which anticipated gross earnings have been reduced. Further reductions would make it necessary to let the property run down, to provide a generally lower grade of service including reduced efficiency in making connections, and to influence many other operations that would ultimately lower the quality of service as a whole.

Appended to the bulletin are statements which contain facts for use in discussions over telephone rates. These point out that while it is true that a business depression does not affect a telephone company in the same extent that some other lines are affected, it is equally true that during prosperous times their earnings are not increased in the same proportion as many other lines.

When times tighten, careful management can minimize the effect of reduced reve-

nues only in part because maintenance, depreciation, taxes and interest continue at the old levels. Where plant has been built in advance of use, carrying charges continue regardless of depressions. The percentage of uncollectible bills increases, as more stations are ordered out, expense of removal increases, and the work of obtaining new customers for old means higher sales costs. The net effect of the recession has been that the ratio of earnings to investment is reduced.

It is also pointed out that while other businesses have the same items of expense as have telephone companies, there is a decided difference in the speed with which reduced commodity prices can be reflected in selling costs. In the average mercantile business the investment turns over several times a year, while in the telephone business the turnover is very slow.

Manufacturers, for instance, buy raw materials from which to make a finished product. If these raw materials can be bought at a lower price, they can sell their products at a lower price and still make the same percentage of profit as before. A retailer who buys fabricated goods or produce at a lower price can sell them at a lower price and still make the same profit.

Telephone companies, however, do not deal in products which can be bought at a lower price and then sold shortly at a lower price. They sell a service. The materials and equipment which are bought go into telephone property to remain there for a period of years. They are not bought to sell but to use in providing service just as the merchant would put up a building to use.

Outline of Program Indicates Good National Convention.

The United States Independent Telephone Association's annual convention, to be held at the Stevens Hotel, Chicago, October 20-23, promises to be one of the most interesting yet held by the national organization. The main topic is "Business." Every man is wondering as to the future of his business. Many are scrutinizing their past practices and wondering if they are following the right procedure to maintain a successful organization.

So, in addition to the division conferences, which this year will be in the form of breakfast and luncheon meetings, three general sessions have been arranged at which "Business" will be discussed. The first of these will be the opening session on Tuesday, October 20, when there will be presented a discussion of the question, "The Net Results of Sales Campaigns."

This discussion will be participated in by prominent operating men from various parts of the country who have themselves conducted new business drives and are in touch with other campaigns and, therefore, in a position to express a conclusion as to the net results of these commercial activities. This discussion will be under the leadership of R. F. Wilder of St. Paul, Minn., chairman of the commercial division, whose presentation of any commercial problem is always instructive and interesting.

The second business session will be the general session on Wednesday. Dr. David Friday will speak on "The Future of Industry," Professor R. E. Pattison Kline will discuss "America in a World Neighborhood," and President MacKinnon of the association will present his annual analysis of telephone conditions.

Dr. Friday was financial advisor to the Treasury Department at Washington during the World War and was special advisor to the Postmaster General while the telephone properties were in the control of the government. During this time Dr. Friday was placed in close touch with the chief executives of the larger Independent companies who will welcome this opportunity to hear him discuss the national economic problems.

Professor Kline is well known to Independent men. He has addressed the association before and will be well remembered for his interesting discussions of economic and political questions. In "America in a World Neighborhood," Professor Kline will talk of problems of real interest, in his forceful entertaining way.

The third business session will be that held Friday morning when the class A companies will join the B and C class companies in discussing the problems confronting the telephone companies in complying with the requirements of the new Interstate Commerce Commission depreciation order and in connection with the changes proposed in the accounting rules of the Interstate Commerce Commission.

This meeting should be well attended by the executives of the larger companies who have a mutual interest in the proper presentation of the depreciation problem to the state and Interstate commissions.

The plant division will hold its session on Wednesday afternoon. A. L. Stadermann, chairman of the plant division, will discuss the new standard specifications for wood poles and the engineering of pole line. This discussion will be followed by an address by Ray H. Manson on "The Relation of Radio and Telephony." This question has been asked often: "What are to be the future relations of telephony and radio?" Perhaps Mr. Manson will not attempt the final answer, but no doubt he will be able to analyze the situation and point out the tendencies and developments.

The Independent Pioneer Telephone Association of the U. S. will give its annual luncheon and entertainment on Thursday, the third day of the convention. The success of past entertainments guarantees a fine one this year.

The manufacturers have arranged for exhibit space more liberally than heretofore. Several are promising to demonstrate something new in the equipment line.

The outlook is for a large, interested convention which should be attended by every live telephone manager and his staff.

Fine Entertainment for Annual Independent Pioneers' Luncheon.

The entertainment committee of the Independent Pioneer Telephone Association of the United States has held a number of meetings during the past month to make arrangements for the annual luncheon and entertainment of the association. This is to be held on Thursday, October 22, at the Hotel Stevens, Chicago, and is the big entertainment feature of the annual convention of the Independent Telephone industry.

Last year the entertainment furnished by the National Broadcasting Co. made a great hit and was heartily enjoyed by everyone. The committee this year, therefore, decided on the same kind of high class entertainment to be furnished by the National Broadcasting system.

The morning session will begin at 10:00 o'clock. President Frank L. McKinney will give his annual report and will be followed by Secretary-Treasurer J. K. Johnston. The subject, "Pioneering Today for the Future of Independent Telephony," will be spoken on. Motions and resolutions, election of officers and discussions of general business will complete the morning meeting.

The luncheon will begin at 1:00 o'clock and a large crowd is expected. The entertainment will take up the greater part of the afternoon and will include musical and comedy sketches. Some of those taking part in the entertainment are well known to radio listeners through being heard "over the air."

The association calls the attention of its members to the importance of bringing their service badges.

Preparations to Link Bulgaria and Greece by Telephone.

The director of the post, telegraph and telephone service of Bulgaria has announced that preparations are being made to link Bulgaria and Greece by telephone through Koula, on the Greek-Bulgarian frontier.

On April 1, 1931, telephone communication was successfully established between Saloniki and Skoplje and Belgrade. Because of the difference in the intensity of the currents available on the Saloniki-Skoplje-Belgrade line and the Saloniki-Athens line it will not be possible to communicate for the time being directly between Belgrade and Athens until the suburban Saloniki-Athens line, now under construction, is completed. Operators speaking the French language will be employed on this line in order to facilitate communications.

Here and There in Telephone Work

"I Wonder Why" of an Observing, Traveling Telephone Engineer.

By Ray Blain

I wonder why equipment circuit drawings do not receive better care around the average telephone exchange for certainly they are quite important.

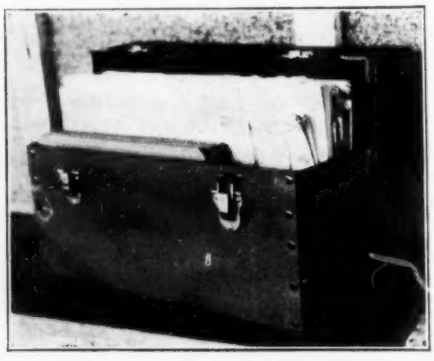
Go into the average exchange and ask for a certain drawing, and the men will start a hunt. They will look through a bunch of old drawings, mixed up with all kinds of papers in every drawer in the wire chief's desk. Perhaps they will have a pile of old, dirty, ragged drawings piled on top of the test board, and they may even find a few inside or on top of the switchboard.

Circuit drawings to my mind are one of the most important items around the exchange, and they are entitled to the best of care. If unusual trouble happens which puts the exchange in part or all out of service, one must refer to circuit drawings if the trouble is to be cleared quickly.

There has recently been placed on the market a small inexpensive blue print container which will be found an ideal receptacle for the circuit drawings in the small and medium exchange.

This container is made from a good grade of fibre, and of a size which permits it to take the average drawing without much folding. Drawings should be folded properly and indexed either by writing the title on one corner or by numbering. If the numbers are used, an index of the numbers should be placed on a card and kept in the front of the file.

One very desirable feature of this container is that it can be carried by the switchboard man to his work. Usually when a man starts out to clear a case of trouble he must refer to several different drawings. Just what drawings he will require are hard to determine beforehand.



Inexpensive Container for Filing Circuit Drawings. Its Convenient Size Enables the Switchboard Man to Carry It to His Work.

With this container the drawings can be referred to, refolded and replaced in the container before the second drawing is unfolded. Not only will this system keep the drawings available for instant use but it will keep them in good condition and they will last much longer. This small investment will, I am sure, prove a good one in any exchange.

LIGHT

By "Buck."

We useta read by candle-light, not s'awful long ago. When darkness fell an' shades o' night come 'round, then Ma would go an' light a candle, maybe two. Then Pa would set an' read; the chores were done he hadda do, the stock all had their feed.

An' all us kids would lay around upon the ole pine floor, while Ma an' Sis jes' wound an' wound six skeins o' wool or more.

Then one day Pa brought home a lamp. By gosh! It sure seemed bright, an' of all lights it seemed the champ, made daylight outa night.

They started drillin' on our place —by heck, they struck a gasser. By gum! It proved to be an Ace. We read by gas, then, yas, sir!

An' then one day they dug some holes, right 'long our doggone road, an' in the holes they sot some poles, a whole dad-burn car-load. An' then we had electric light in ev'ry dad-burned room. When all lit up, it was some sight, dispellin' all the gloom.

An' it may not be fur away—our kids may not be grown—that we'll be livin' in the day they'll see by telephone!

Investigate Insect Damage to Cables in Siam.

For many years most tropical countries have been bothered with the depredations to telephone and telegraph cables caused by insects, reports U. S. Assistant Trade Commissioner Joe D. Walstrom, Bangkok, Siam. In Siam, it was formerly thought that the culprit was the "termite," or white ant. However, recent investigations have been made in this connection by Major W. R. S. Ladell, of the Division of Agricultural Science, and it has been pretty definitely proved that the insect responsible is the carpenter bee.

The most effective remedy against these damages is to place a thin armor of brass around the lead cable. This is an expensive undertaking, however, and in lieu of it experiments are being carried on whereby the cable is coated with a mixture of equal parts of tar and sand. It is believed that this gritty substance will prove a deterrent to the carpenter bee.

P. B. X. Current Supply; Maintenance of Storage Battery (Ctd.).

By. John A. Bracken.

In P. B. X. storage battery maintenance practices the term "pilot" is used to indicate the amount of charge in a cell. The word also applies to several specially-colored hollow glass balls. In order to make apparent the specific gravity of the electrolyte in a cell without the necessity of its measurement with a hydrometer, one cell (or even all the cells) in the P. B. X. battery is provided with a pilot ball gauge as shown in Fig. 1.

This is an enlargement or pocket in the glass jar in which floats three hollow glass pilot balls, colored red, white, and green and of such weight that they will at any time indicate by their position the relative density of the electrolyte.

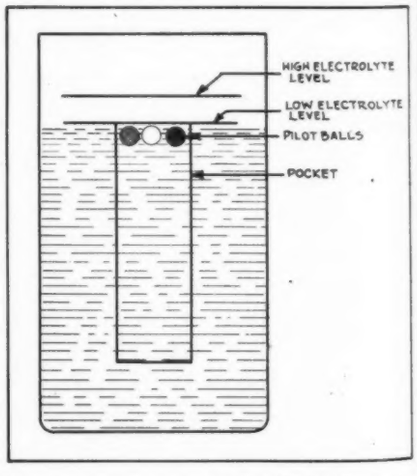


Fig. 1. Storage Cell Containing Pilot Balls.

The action of the pilot balls is as follows:

If all of the balls float, the specific gravity of the electrolyte is at least 1.285, in-

dicating that the cell is fully charged. Should the white ball sink and the red and green balls float, the specific gravity of the liquid is between 1.225 and 1.285, showing that the cell is more than half charged.

If both the white and green balls sink, the specific gravity of the cell electrolyte is between 1.150 and 1.200, in which event the cell is at least half discharged. The sinking of all three balls signifies that the specific gravity is less than 1.150 and that the cell is completely discharged.

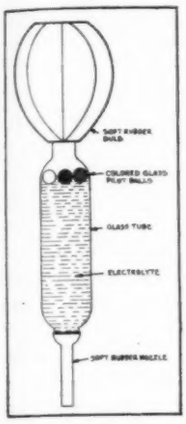


Fig. 2. The Pilot Ball Hydrometer.

It is very necessary, in connection with the use of pilot balls, that the maximum specific gravity of the cells be as near as possible to that specified by the manufacturer. Any great variation higher or lower will affect the operation of the pilot balls.

Fig. 2 represents another type of P. B. X. storage battery electrolyte tester and is known as the pilot ball hydrometer. It consists of a glass tube with a soft rubber syringe bulb at the top and a rubber nozzle at the bottom, and contains three colored glass balls of various density values.

If all of three balls float in the hydrometer, it indicates that the cell being tested is fully charged. If on shaking the balls up with the electrolyte in the hydrometer, the white ball sinks very slowly, the specific gravity is very near 1.285. If it sinks rapidly, the density of the electrolyte is down near the 1.225 point.

If both the white and the green balls sink, that cell is about half discharged or low. Just how low it is, is indicated by the speed with which the green ball sinks in the electrolyte. The sinking of all three balls signifies complete discharge of the cell; that is, the density of the specific gravity of the liquid is less than 1.150.

It is very noticeable that very high temperatures affect the operation of the pilot balls. This accounts for the fact that occasionally a P. B. X. storage battery will be fully charged and the pilot balls in the cell will be at the bottom of the pocket. A few hours later after the electrolyte is cooled, the pilot balls will rise to the top.

In general, the pilot ball is an excellent gauge of the actual amount of charge in a storage cell and a very good signal to watch in connection with the operation and maintenance of P. B. X. storage batteries.

Under certain conditions the battery may become completely discharged and, in face of the emergency, may necessitate recharging it in the maximum of time. This requires that the battery be given a charge at the highest current rate available that could be safely used within the capacity of the charging apparatus and connections.

For example, if the charging apparatus was capable of producing 2.5 amperes and the wiring would carry this amount of current, it would be safe to use this even though the normal charging rate were but 0.5 ampere. This is called a quick charge.

With this method of emergency charging, the battery should be very closely watched and as soon as signs of gassing are in evidence or the temperature in the cells approaches 105°F., the charging rate should be reduced, taking care to make the reduction as soon as gassing appears and continuing until the normal finishing rate of the battery is reached and completing the charge at the finishing rate.

Although it is safe to charge a P. B. X. storage battery at the highest rate it will absorb without gassing—in which manner the charge is carried on in a fraction of the time ordinarily required—this practice should not be resorted to except in cases of emergency, as the longer normal charge at a low rate is naturally preferable and should always be followed.

Miss Gissella Massera, in Native Indian Costume of Guatemala, with Guatemala City Telephone Directory and 1931 Directory of Pacific Bell, Showing Cover Used in 74 of Pacific Coast Directories.

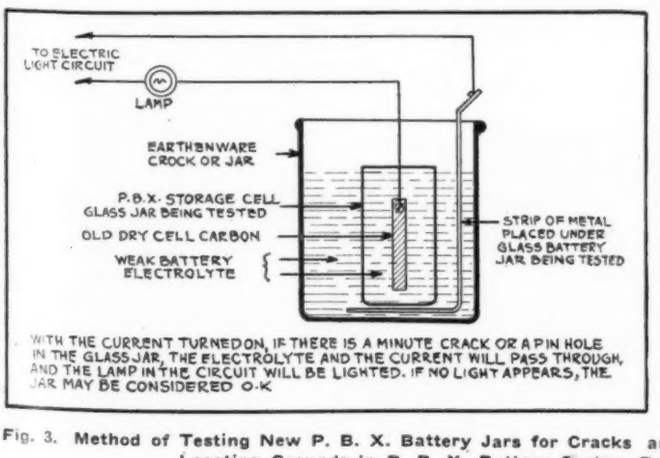
San Francisco's Directory One of Six Largest in Circulation.

The San Francisco metropolitan area telephone directory is now one of the six largest in circulation in America, according to Division Manager Lyle M. Brown, of the Pacific Telephone & Telegraph Co.

"California has two of the six largest American telephone directories in point of circulation, the San Francisco-Oakland and Los Angeles books," said Mr. Brown. "The Pacific Coast has four of the 26 largest, in San Francisco-Oakland, Los Angeles, Seattle and Portland. This may seem strange, in view of the heavily-populated East, but it is because the Coast has four out of the first 11 cities in America with the greatest number of telephones per capita."

About one-fifth of the Pacific coast's total Bell telephone directory circulation, 4,000,000 copies annually, one of the largest group editions of its kind in America, is in San Francisco - Oakland area. American telephone directories total 2,230, with over 35,000,000 annual circulation.

The new directory shows America's telephone leadership compared with foreign countries. The telephones listed in it exceed the Paris total of 370,000 and nearly equal the total in Vienna, Rome, Moscow and Copenhagen combined.


TO ELECTRIC LIGHT CIRCUIT
LAMP
EARTHENWARE CROCK OR JAR
P.B.X. STORAGE CELL GLASS JAR BEING TESTED
OLD DRY CELL CARBON
WEAK BATTERY ELECTROLYTE
STRIP OF METAL PLACED UNDER GLASS BATTERY JAR BEING TESTED
WITH THE CURRENT TURNED ON, IF THERE IS A MINUTE CRACK OR A PIN HOLE IN THE GLASS JAR, THE ELECTROLYTE AND THE CURRENT WILL PASS THROUGH, AND THE LAMP IN THE CIRCUIT WILL BE LIGHTED. IF NO LIGHT APPEARS, THE JAR MAY BE CONSIDERED O.K

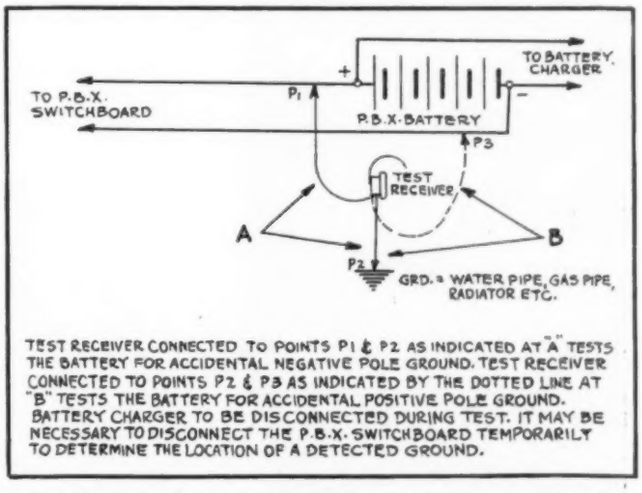

TO BATTERY CHARGER
TO P.B.X. SWITCHBOARD
P1
P.B.X. BATTERY
P3
TEST RECEIVER
A
B
P2
GRD. = WATER PIPE, GAS PIPE, RADIATOR ETC.
TEST RECEIVER CONNECTED TO POINTS P1 & P2 AS INDICATED AT "A" TESTS THE BATTERY FOR ACCIDENTAL NEGATIVE POLE GROUND. TEST RECEIVER CONNECTED TO POINTS P2 & P3 AS INDICATED BY THE DOTTED LINE AT "B" TESTS THE BATTERY FOR ACCIDENTAL POSITIVE POLE GROUND. BATTERY CHARGER TO BE DISCONNECTED DURING TEST. IT MAY BE NECESSARY TO DISCONNECT THE P.B.X. SWITCHBOARD TEMPORARILY TO DETERMINE THE LOCATION OF A DETECTED GROUND.

Fig. 3. **Method of Testing New P. B. X. Battery Jars for Cracks and Pin Holes Before Replacing Broken Cells.**—Fig. 4. **Method of Locating Grounds in P. B. X. Battery System Requiring Only a Head Set Receiver for Testing.**

Group in Attendance at the Interesting and Instructive District Meeting at West Liberty, Iowa, Which Was the First of the Season Held by the Iowa Independent Telephone Association.

Iowa Association Holds First District Meeting of Season.

The season's first district meeting of the Iowa Independent Telephone Association was held in West Liberty, September 28. H. B. Melick, president of the association and manager of the West Liberty Telephone Co., welcomed the large group of 83 telephone people who attended.

The morning program included a demonstration by the Northwestern Bell Telephone Co. of the inductive interference of an electric line on a parallel telephone line under the varying conditions that are met with in actual practice.

A miniature pole line carrying power wires was set up and paralleling it a telephone line. The power line was energized and the inductive interference of this line on the telephone line was shown, and by means of amplification audibly demonstrated.

H. H. Carl, foreign wire relationship superintendent of the company, made the talk accompanying the demonstration and was assisted in the demonstration by Fred Foster of Des Moines.

Charles C. Deering, secretary of the Iowa Independent Telephone Association, Des Moines, was in charge of the men's meeting in the afternoon, which consisted of a round table discussion. Those taking part and leading the principal discussions were Mr. Melick, West Liberty; J. T. Butler of West Branch and Carl Cone of Iowa City.

Rural line service was one of the principal discussions, and in connection with it the inductive interference and the many power lines being built through the country.

Miss Anne Barnes, traveling chief operator of the Iowa Independent Telephone Association, assisted by Anabelle Clark, traveling district instructor, of the Northwestern Bell Telephone Co., of Davenport, conducted a women's group meeting in the afternoon.

Statistics Regarding Telephones of Canadian Provinces.

Francis Dagger, supervisor of telephone systems for the Province of Ontario, Canada, sends TELEPHONY his report for 1930 which serves as an appendix to the annual report of the Ontario Railway and Municipal Board.

The report contains statistical information relative to the telephone systems in the province, applications for various forms of authority, and data covering operations. On December 31, 1930, there were 1,419,854 telephones in all of Canada, a gain of 13,690 since 1929. The Bell of Canada had 784,796 stations in Quebec and Ontario, a little over half the total. Non-connecting stations in those two provinces numbered 8,692.

In the other provinces, Manitoba, Saskatchewan and Alberta have government systems, while municipal and privately owned companies operate in the remainder.

The report says the British Columbia Telephone Co. operates 128,876 stations in that province; the Maritime Telephone & Telegraph Co. operates 47,193 telephones in Nova Scotia; the New Brunswick Telephone Co. has 34,959 in New Brunswick, while the Prince Edward Island Telephone System has 5,712.

Saskatchewan has 98,354 telephones, of which 40,999 are government-operated; Manitoba has 78,658, of which 73,415 are government-operated, and Alberta has 78,784, of which 60,126 are government-operated.

With an estimated population of 10,009,500, Canada has 14.18 telephones per 100 people.

Answers to Traffic Questions Presented on Page 18.

1. On a call that has been held over from a previous day, if the calling party is ready to have the call tried, ask him to hold the line and proceed in general as on a first attempt. Enter the time at which he is ready to have his call tried, encircled, in the "Filing Time" space, unless, prior to the time the request to try the call on a later day was received, a chargeable report had been given, or the specified time limit has expired.
2. On all tickets covering calls on which a charge is to be made, except tickets covering station-to-station calls at day rates, print a capital letter indicating the class of service in the "Class" space. Use the following letters:
   E—for completed station-to-station calls at evening rates.
   N—for completed station-to-station calls at night rates.
   P—for completed person-to-person calls.
   R—For calls on which a report charge is to be made.
3. When you encounter an NC condition on all authorized routes, you dismiss the calling party at the end of one minute, if you have not been able to secure a circuit, but you continue to hold the calling party's line. When you secure a circuit you do not reach the calling party until you are ready on the call or until you have obtained a report.
4. To clear a built-up circuit, ring on the circuit and when the intermediate operator challenges, say, "Clear to (distant toll center)." When the intermediate operator says, "Right," release the toll circuit. However, if the toll circuit is connected to a ringdown trunk at the terminating toll center, say, "Clear to (called place)."
5. The tributary chief operator is responsible to her manager for the service in her office.

New Ownership Rehabilitates Plant

United Telephone Co., of St. Marys, W. Va., Completes Comprehensive Construction Program at Cost of About $26,000—Increased Rates Authorized for Improved Service to Subscribers—Employe Meetings Result in Improved Service

By L. M. Hayes

A comprehensive construction plan, involving the expenditure of $26,000 and extending over a period of about two years, was completed recently by the United Telephone Co., of St. Marys, W. Va. The program of improvements included the placing of approximately 17,000 feet of lead-covered cable, containing more than 460 miles of copper wire.

In the rural districts about 14 tons of new wire have been strung and hundreds of poles and crossarms have been used in extensions and replacements. Party lines have been split up in order to reduce the number of parties on a line and improve service to rural patrons. The company has approximately 100 miles of pole line, with 350 miles of open wire, in addition to the 17,000 feet of lead-covered cable recently installed.

The office equipment has also been improved by the addition of a stub billing machine and an addressograph. These have made possible more accurate and speedy billing of the subscribers. The work done by these machines is shown in the accompanying illustration. "This billing machine is very unique and efficient and is almost a robot," President H. C. Marsh says.

The United Telephone Co. serves practically all of Pleasants county, W. Va., from one exchange, St. Marys. The exchange was acquired on March 1, 1928, by H. C. Marsh, who is now president and general manager of the corporation. The following August the Citizens Telephone Co., a competing concern, was taken over and merged with the United company.

Before moving to West Virginia Mr. Marsh owned and operated telephone exchanges at Shirley, Pennville and Van Buren, Ind. Since assuming charge Mr. Marsh has sponsored many improvements in service.

Manager H. C. Marsh of the United Telephone Co., St. Marys, W. Va., and Members of His Operating Force. Left to Right, Top Row: Miss Gladys Green, Mrs. Opley Gooseman and Miss Hazel Powell, Cashier; Second Row: Mrs. Mary Williams, Mrs. Juanita Taylor, Miss Virginia Weber; Bottom Row: Alberta Marsh, the Manager's Young Daughter, Mrs. H. C. Marsh, Chief Operator.

Photograph Taken at Recent Banquet Attended by Employes of the United Telephone Co., of St. Marys, W. Va.—Below Is Presented a View of the St. Marys Central Office Building, in Which May Be Seen a Sample of the New and Old Construction; The Center Group Photograph Shows H. E. Seckman, Manager H. C. Marsh, Roy Seckman, Oak Smith and Bernard Bayless; To the Right Is Shown Another Example of Plant Improvements. Old Poles and Wires on Right Have Been Removed.

Under his direction, the system has practically been rebuilt and much of the old plant in the city of St. Marys has been replaced. Approximately 600 subscribers in St. Marys and vicinity are now being served. The St. Marys exchange has three toll circuits to Marietta, Ohio, three to Parkersburg, four to Sistersville and one each to Ellenboro, Pennsboro and Mole Hill. No toll rate is charged throughout Pleasants county and in a large part of Ritchie county.

Another policy adopted by the company, and approved by the West Virginia commission, is that of adding a penalty of 5 per cent (minimum

25 cents) after the 15th of the current month. This practice, it is stated, has proved very successful in reducing the number of late remittances.

The company recently placed in effect a schedule of increased rates, approved by the West Virginia Public Service Commission. The new schedule provides the following rates for metallic service: Individual line business telephone $4 per month; two-party business, $3.25; four-party business, $2.50; business extension, $1; individual line residence, $2.25 per month; two-party residence, $2; four-party residence, $1.75; extension set, 50 cents. A rural rate of $1.50 per month, for wall sets only, is provided for business or residence grounded rural service.

Terminal Pole at End of 26-Pair Cable Running Into Rural District. New Open Wire Lead Running Up Over Hill.

Looking to the future, the company plans to install common battery service with the latest features within two years.

The former rate schedule of the United company, in effect since February 1, 1929, included the following rates: Individual line business telephone, $27 per year; individual line residence, $24; two-party business, $20; two-party business and residence, $18; multi-party residence, $16; rural switching of subscriber-owned telephones, $12.

The company recently added some 30 new subscribers to its list, most of them having been solicited by the company's operators. Since the inauguration, about two years ago, of monthly employes' meetings, increased efficiency in their work has been particularly manifest.

Manager Marsh is a firm believer in the use of inserts or "stuffers" enclosed with the monthly bills. One of these offers temporary employment "to subscribers who are out of work or otherwise unable to maintain their telephones and desire to apply such earnings on their telephone accounts." Another slip calls subscribers' attention to information relating to long distance and out-of-town calls.

The personnel of the company consists of Mrs. H. C. Marsh, the chief operator, and the other operators including Miss Gladys Green, Mrs. Opley Gooseman, Mrs. Mary Williams, Mrs. Juanita Taylor, Miss Virginia Weber, and Miss Hazel Powell, cashier. The plant and construction crew include H. E. Seckman, Roy Seckman, Oak Smith and Bernard Bayless.

Belgian Telephone System a Semi-Private Monopoly.

The telephone and telegraph system of Belgium, by a law passed July 19, 1930, was put under the control of a semi-private monopoly which began operations on November 1, 1930, according to a news dispatch from U. S. Commercial Attache R. C Miller, Brussels, Belgium. The statistics of accounts for the new monopoly for the fiscal period, March 1, 1931, to February 29, 1932, have just been published and show expenditures at 972,697,328 francs (one Belgian franc equals approximately $0.0278), and estimated receipts at 976,181,100 francs.

The monopoly is authorized to contract loans up to a total of 750,000,000 francs for the purpose of covering operating expenses. The amount and terms of such loans will be determined by agreement between the minister of finance and the minister of posts, telegraphs and telephones. The state guarantees interest and amortization on the loans.

The 1931 Edition of National Electrical Code Approved.

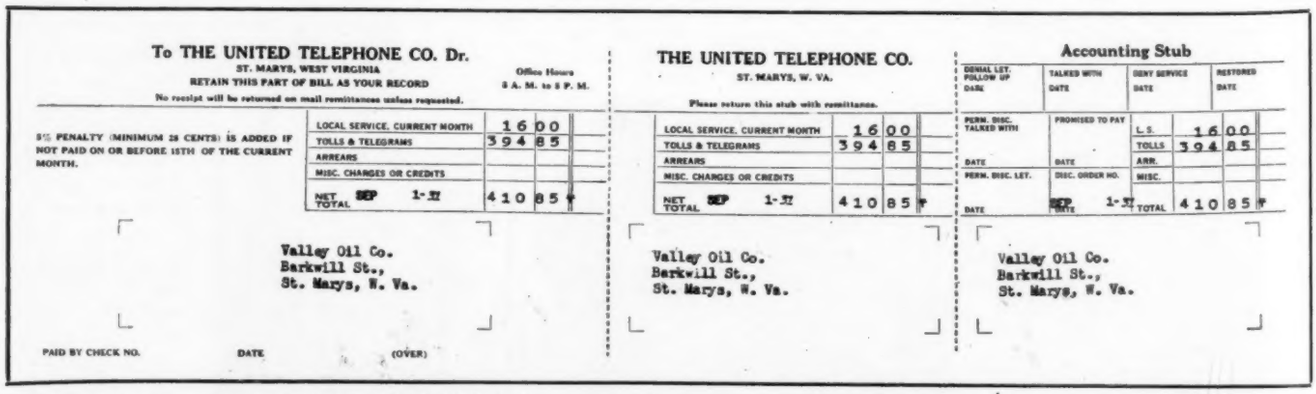
Approval of the 1931 edition of the National Electrical Code by the American Standards Association was recently announced by the association, following the submittal of the code by the National Fire Protection Association, sponsor for the sectional committee in charge of the revision of the code under ASA procedure.

A first edition of 200,000 copies is being printed by the National Board of Fire Underwriters and copies will shortly be available through the board's offices in New York, Chicago, and San Francisco, or from the headquarters of the American Standards Association, 29 West Thirty-ninth street, New York, N. Y.

The 1931 edition represents the 15th revision of the original National Electrical Code as first published in 1897. The committee in whose hands the revision rests includes 43 technical representatives of 26 national, state and local associations, inspection departments and other organizations proving a complete cross section of the electrical industry insofar as it is concerned with the scope of the code.

The scope includes "requirements for the installation of electric wiring and equipment for light, heat and power, as they affect the fire hazard and for signaling systems, so far as they may involve such hazard." The code also includes "equipments affecting the life hazard in numerous applications and uses."

An analysis of the 1931 revision of the code compiled by A. L. Abbott and containing in detail all of the differences between the 1930 and the 1931 editions, has been published by the National Electrical Manufacturers Association, New York City, as publication number 31-11, August, 1931, and is for sale by the NEMA office at ten cents per copy.



To THE UNITED TELEPHONE CO. Dr.
ST. MARYS, WEST VIRGINIA
RETAIN THIS PART OF BILL AS YOUR RECORD
No receipt will be returned on mail remittances unless requested.
Office Hours 8 A. M. to 5 P. M.

5% PENALTY (MINIMUM 25 CENTS) IS ADDED IF NOT PAID ON OR BEFORE 15TH OF THE CURRENT MONTH.

LOCAL SERVICE, CURRENT MONTH	16 00
TOLLS & TELEGRAMS	394 85
ARREARS	
MISC. CHARGES OR CREDITS	
NET TOTAL SEP 1-32	410 85

Valley Oil Co.
Barkwill St.,
St. Marys, W. Va.

PAID BY CHECK NO. DATE (OVER)

THE UNITED TELEPHONE CO.
ST. MARYS, W. VA.
Please return this stub with remittance.

LOCAL SERVICE, CURRENT MONTH	16 00
TOLLS & TELEGRAMS	394 85
ARREARS	
MISC. CHARGES OR CREDITS	
NET TOTAL SEP 1-32	410 85

Valley Oil Co.
Barkwill St.,
St. Marys, W. Va.

Accounting Stub

DENIAL LET. FOLLOW UP DATE	TALKED WITH DATE	DENY SERVICE DATE	RESTORED DATE
PERM. DISC. TALKED WITH	PROMISED TO PAY	L.S.	16 00
		TOLLS	394 85
DATE	DATE	ARR.	
PERM. DISC. LET.	DISC. ORDER NO.	MISC.	
DATE	SEP DATE 1-32	TOTAL	410 85

Valley Oil Co.
Barkwill St.,
St. Marys, W. Va.

A Bill of the Type Rendered by The United Telephone Co., St. Marys, W. Va., Showing the Amount of Work Done by a Stub Billing Machine and an Addressograph Making Possible More Speedy and Accurate Billing of Subscribers' Accounts.

With the Manufacturers and Jobbers

American Electric Introduces New Distributing Wire.

A new high grade drop wire is being announced this week by American Electric Co., Inc., in folders which are being sent to telephone companies. According to the announcement, the new wire is to carry the "Monotype" name to identify it with other American Electric products.

Among the claims made for the new product are that it has "a stronger conductor, a heavier braid and an improved rubber insulation." Complete specifications covering the manufacture of the wire are given as well as tests for determining specific qualities.

The new wire is to be manufactured exclusively for American Electric Co., Inc., by General Cable Corp., which has 22 plants in various parts of the United States, producing insulated and other types of wires. Two of the plants making this wire are shown in the accompanying illustrations. The conductor of the wire is an improved "Copperweld" design made with an electric-furnace steel core for greater strength.

It is said that complete specifications together with samples of the new wire will be furnished to all who request them. For full information, write to American Electric Co., Inc., 6126 S. La Salle street, Chicago, Ill.

Kester Solder Co. Opens New Canadian Plant.

The Kester Solder Co., Chicago, Ill., originator of self-fluxing solder, announces the establishing and opening of a plant at Brantford, Canada. The new plant commenced operation September 15 under the name Kester Solder Co. of Canada, Ltd.

This newest member of the Kester plants increases the number to three strategically-located manufacturing sources—general offices and plant located at Chicago, the Newark, N. J., plant to serve the eastern seaboard and water shipments, and now the Brantford plant for Canada.

F. C. Engelhart, president of the Kester Solder Co., commented concerning the Brantford plant: "As with the establishing of our Newark, N. J., plant, it is our desire to give our customers the best service possible. Canada could not be efficiently served without a plant located in the Dominion. Our three plants enable us to produce economically and as well expedite service."

"Kester sales are ahead of last year," says J. A. Reitzel, general sales manager of Kester. "This fact is attributed to an even more aggressive merchandising effort on the part of both Kester, as the manufacturer, and our distributors. Canadian sales possibilities seem exceptionally bright because of Kester's already strong position and promise of more ready sales now the Canadian plant is in operation."

The Kester Solder Co. manufactures a complete line of solders including Kester acid-core, plastic rosin-core, paste-core, Kester metal mender, Kester radio solder, body solders, solid wire and bar solders and specials. All of these products will be manufactured in the Brantford plant.

Iowa Exchange to Get Stromberg-Carlson Central Energy Board.

The Western Telephone Corp. of Iowa has just purchased five sections of the Stromberg-Carlson No. 13 unit type switchboard for its Ida Grove, Iowa, exchange. It will be equipped with 600 common battery, 40 rural and 20 toll lines. It also will be complete with power, terminal and machine equipment.

The equipment will be installed in a fine new building being erected by the Western Telephone Corp. Its installation will inaugurate a cutover from magneto to common battery operation.

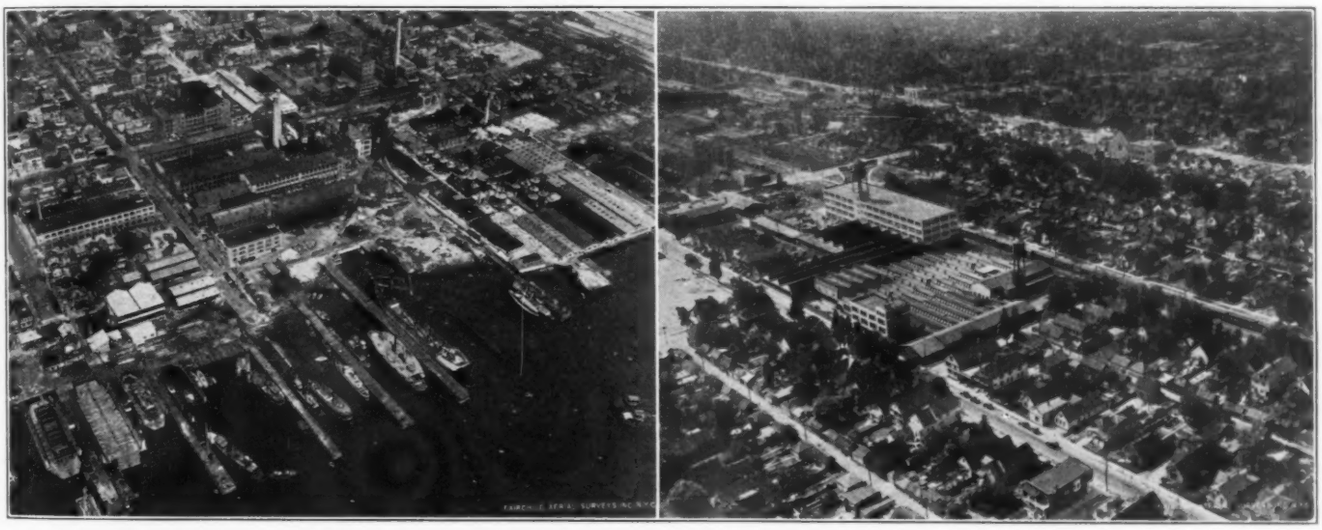
Variety of Information Contained in Pole Handbook.

The third edition of the Page & Hill handbook on poles is now available. A wide variety of practical information of value to telephone men is concisely presented in this 40-page booklet.

This edition carries the new tentative American standard specifications. It also includes the moments of resistance for poles falling under the new American Standards Association classification, as well as the weights and the minimum number of poles required for a carload in an American Standards Association pole.

In addition, there is included considerable information on the subjects of staining, storage, and accident prevention in the handling of poles. Diagrams show method of measuring sweep and short crooks in poles. Other illustrations show proper and improper methods of measuring top and ground line circumferences, instructions for framing, types of carloads, and safe methods of unloading poles from railway cars.

The Page & Hill handbook is said to be the only handbook on cedar poles and butt-treating. It has had a wide distribution in the past. Copies of the new edition may be obtained by addressing the Page & Hill Co., Plymouth Building, Minneapolis, Minn.



Aerial Views of Two Plants of General Cable Corp., the Manufacturers of the New Drop Wire Announced by American Electric Co., Inc. At Left Is the Perth Amboy, N. J., Plant.—At the Right Is the Detroit, Mich., Plant.

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Rural Telephone Exchange Development

City Telephone Systems Spread Outwards—This Year's Rural Subscribers' Lines Will Serve Next Year's Rural Exchanges as Trunk Lines—Modern Automatic Exchanges Now Developing Fringe of Every Telephone Network

By R. A. Kier,

Automatic Telephone Mfg. Co., Ltd., Liverpool, England

Accurate forecasting of telephone growth is one of the most important of every telephone administration's activities. Without it, heavy cables may be laid where they are not wanted, or, more likely, cables may fill up soon after they are laid, and have to be duplicated. Either way eats into profits.

Planning ahead in dense city networks is a matter of routine to every telephone administration. The fringe of the network is less certain. Lines serving subscribers in outer suburbs must be converted sooner or later to trunks serving suburban exchanges. How many subcribers justify a suburban exchange? If the installation of a suburban exchange be delayed until, say, 50 subscribers exist, then there will be 50 lines available for use as trunks, and about 45 of them will not be wanted.

The dismantling of a costly air line or cable route is avoided by the installation of a suburban or rural exchange at an early stage of development, and the cost of future development is thereby greatly reduced. The automatic system has been adopted very widely for this purpose, because it provides a main exchange grade of service to a small community at low cost.

It is convenient to divide rural automatic exchanges into three types, according to the service conditions they have to meet. The sketch map gives an example of all three types. Exchanges *A, B, C, D* and *E* form a network of R. A. X.'s. Traffic within this network is handled automatically. Toll calls, either into or out of this network are handled by operators at the manual exchange at *F*. These five R. A. X.'s may be called "rural main offices," because they form a self-contained multi-office area.

The R. A. X.'s at *K* and *J* serve the outer suburbs of the town, and are "satellite offices" on the two main exchanges, *G* and *H*, which are automatic. A satellite R. A. X. is installed in order to extend the town telephone service into its outer suburbs or the surrounding villages. The subscribers at the satellite exchanges are given exactly the same service as they would receive if each one were connected by an individual line to the main exchange.

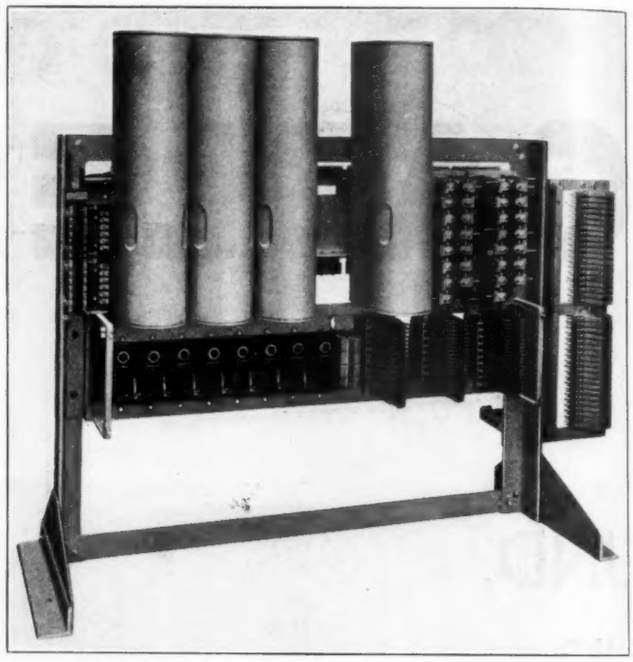

Fig. 2. A 20-Line, Self-Contained, Factory-Wired, Rural Automatic Exchange Unit.

The equipment at the satellite office is, in fact, arranged so that when the subscriber lifts his receiver he is at once connected straight through to the parent exchange (before dialing). When he dials, all the digits are received just as though the call had originated from a subscriber on the parent exchange. This arrangement avoids the confusion which inevitably arises if the R. A. X. subscriber is constructed to dial a "prefix" digit in front of the number of a town subscriber in order to pick up a junction to the parent exchange.

If an R. A. X. subscriber dials the number of another subscriber on the same R. A. X., the trunk line is, of course, released, since it will not be required for completing a local call.

Conditions are a little different when the parent exchange to which an R. A. X. is connected is manual instead of automatic. If nearly all the calls originated at the R. A. X. are intended for subscribers connected to a manual parent exchange, then the R. A. X. subscriber's dial is of very little use to him; in fact, it is a disadvantage, because he will have the dial "O" on every call (except a very few local ones) in order to connect himself to the operator at the parent exchange. For this service, therefore, a semi-automatic exchange is used.

A subscriber connected to the S. A. X. is provided with an ordinary common battery or local battery telephone. When he lifts his receiver from the hook, he is at once connected straight through to the parent exchange, where the operator answers him and completes the call in the usual manner.

Should he ask to be connected to a subscriber on the same S. A. X., the operator dials back over the trunk, and removes her plug, thus leaving the two S. A. X. subscribers connected together and freeing

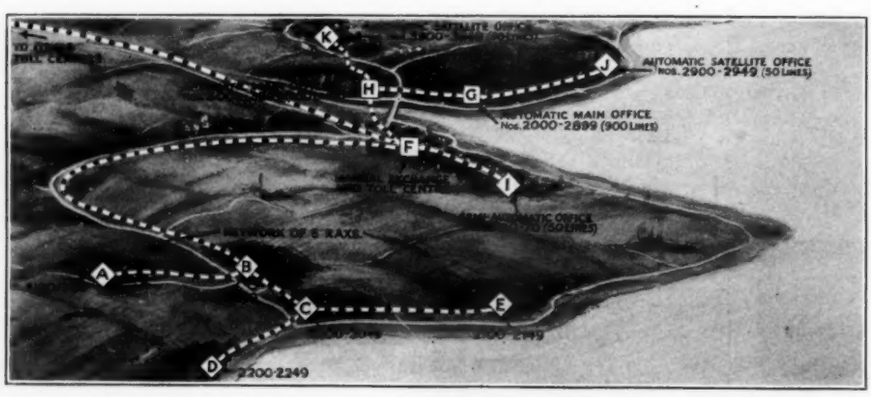

Fig. 1. Sketch Map Showing the Three Main Types of Rural Automatic Exchanges.

the trunk for other calls. The operator completes a call into the S. A. X. by dialing over the trunk, leaving her plug in the jack until the call is finished.

The division of R. A. X.'s into these three main types by no means covers all the variations of service facilities demanded by telephone administrations in various countries. The circuits of the R. A. X. must be arranged to work trunks with a number of types of automatic and manual main exchanges. Calls originated by toll operators must be offered to busy subscribers via the regular switching trains without the provision of special toll offering trunks.

If a system of time-distance metering is in use at the parent exchange for short-haul toll calls it must be applied to the satellite R. A. X. The R. A. X. must fit into existing three, four, five or six-digit numbering schemes without requiring special prefix digits in front of the directory numbers. Phantom or composite service must be provided for on long junction lines, and so on.

To be economically successful, the R. A. X. must be capable of working for very long periods without any attention. This requires many safeguards which are not usually employed in large automatic offices, where a maintenance staff is always available. In particular, faulty lines at the R. A. X. must be prevented from busying common apparatus or trunk lines, and faulty trunk lines must automatically withdraw themselves from service.

The charge and discharge of the batteries must be automatically controlled and must not be upset by temporary failure of the electric supply. Finally, when any irregularities develop at the R. A. X., alarms must be given over the trunks to the parent exchange without withdrawing the trunks from service.

R. A. X.'s which meet all these requirements have been installed in many places, and have proved entirely satisfactory. The demand for this equipment has, in fact, grown to such an extent that the Automatic Telephone Mfg. Co., Ltd., of Liverpool has designed a standard R. A. X. for quantity production.

The statement that one standard switchboard can meet all the diverse requirements outlined may sound startling; standardization has been attained, however, by the use of the well-known Strowger jack-in principle. The standard switchboard has a capacity of 50 lines and trunks. It is built in two self-contained, factory-wired units, which bolt together, one on top of the other. Either unit may be installed by itself as a complete 20-line exchange, which can later be extended to 50 lines by the addition of another unit on top of it.

Fig. 2 shows a 20-line unit, equipped with three connecting circuits. Fig. 3 shows two such units, coupled together to provide for 50 lines and equipped with eight connecting circuits.

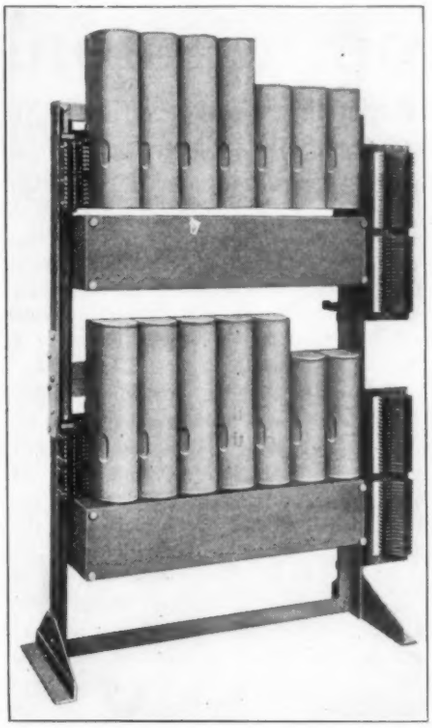

Fig. 3. Two 20-Line Rural Automatic Exchange Units Coupled Together to Provide for 50 Lines.

A connecting circuit consists of two 50-point rotary switches (a finder and a connector) and a group of relays. Four finders and four connectors are permanently mounted and wired on the lower shelf of each unit. The relays which control them are mounted on jack-in bases which are carried on the upper shelf, along with the lines and cut-off relays and the ringing equipment, distributor, etc.

The frame remains absolutely standard, whatever service facilities are required. The connecting circuit relay groups, however, are manufactured in a variety of types according to the requirements of different administrations. Space is left at the bottom of the lower unit for an additional shelf should composite or phantom repeaters be required.

New Site of Transatlantic Wireless Station in Scotland.

The transatlantic wireless telephone station, which was erected four years ago at Kemback, Fifeshire, Scotland, is to be moved to a new site near Cupar, Fifeshire, United States Consul John J. C. Watson, of Dundee, Scotland, has announced recently.

The present wireless telephone station is an experimental one and of a temporary nature.

The station was so successful, however, that it has been decided to build a permanent station to handle wireless telephonic communication with the American continent, and new and improved apparatus is to be installed. It is understood that work on this new station will be begun shortly.

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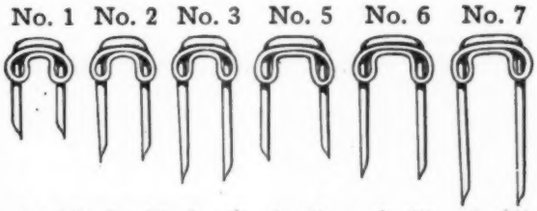

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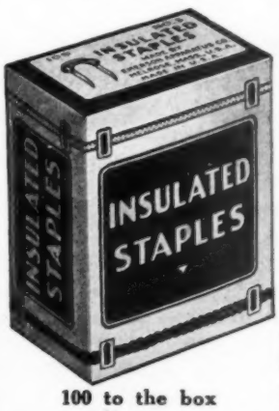

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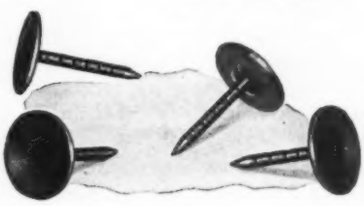

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What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Ohio Commission Asked to Reverse Its Ruling in Bell Case.

The Ohio Public Utilities Commission has been asked by Attorney General Gilbert Bettman, as counsel for the state in the state-wide rate case of the Ohio Bell Telephone Co., to reverse its ruling of June 19 denying a motion by the state to require the company to furnish information regarding standard costs of equipment sold to it by the Western Electric Co.

The attorney general's contention is that a fair valuation of the Bell properties in Ohio cannot be arrived at without determining the actual costs of equipment sold by the Western Electric to the Ohio Bell.

Since the adverse ruling by the commission in June, it is the contention of the state, a reserve ruling was made by the Wisconsin Public Service Commission on July 29, and also by a special master of the United States District Court in Michigan on July 20.

Mr. Bettman contends that in view of these rulings, which permitted the attorneys for the state to have the information sought, the Ohio commission should reverse its June ruling.

Further reliance for the right of the state to have the information sought is based on the decision of the United States Supreme Court in Smith v. Illinois Bell Telephone Co., Mr. Bettman stated.

The attorney general's request was submitted when the commission called up the seven-year-old Ohio Bell rate case for additional hearing on September 28 relative to final valuation of the company's Ohio properties as a basis for the determination of rates.

Michigan Commission Checking Work of Its Experts.

Refusal of Manfred K. Toeppen, one of the three experts employed formerly by the Michigan Public Utilities Commission in connection with an audit and appraisal of the Michigan Bell Telephone Co.'s properties, to submit his work for inspection, caused the commission to reiterate its demands on September 28.

After several days of conferences the Michigan commission on September 25 decided to check the work done by its experts with respect to the appraisal and audit of the Michigan Bell Telephone Co.

Mr. Toeppen, former chief engineer of the commission, declined to submit his work done since last January, to the supervision of Dean Mortimer E. Cooley and Prof. Henry E. Riggs, former members of the University of Michigan engineering faculty, as ordered by the commission. He declared that the commission is fully advised of progress of his work done so far and that he will submit his work to the commission at request, but not to Dean Cooley and Professor Riggs.

"It is not within the scope of my functions," Mr. Toeppen telegraphed the commission, "nor is it within the bounds of propriety to demand of me that I should submit my work, as yet incomplete, and my professional methods and plans for the completion thereof, to the criticism of individuals who are competitors with me in respect to a contract to carry forward the work."

Robert H. Dunn, chairman of the commission, telegraphed Mr. Toeppen on September 28:

"Our telegram of September 25 instructing you to confer with Dean Cooley and Professor Riggs at Ann Arbor has brought us your flat refusal to do so. Thus far you have made statements as to what you were doing, but the commission has not had any engineering data placed before it for inspection.

"Mr. Cooley and Mr. Riggs are this commission's representatives appointed for the purpose of making a survey and reporting to this commission within a week on the progress made to date. . . .

It is for this commission to say what shall be done in this investigation, whether your work is complete or not. Past lack of supervision has led to confusion which we are now remedying through the appointment of Dean Cooley and Professor Riggs.

You are again directed to report to this commission's representatives at Ann Arbor, as previously requested, at 10 o'clock on Wednesday, September 30, 1931, taking with you tangible and concrete results of your eight months' work on this investigation."

Non-Subscribers' Petition for Improved Service Denied.

The Indiana Public Service Commission has denied the petition of Mrs. Louise Steinacher and other patrons of the Central Lakes Telephone Corp., living on, or near Lake Wawasee, Kosciusko county, for improved telephone service.

In its findings the commission held that service provided by the company was above criticism, and that the petitioners apparently were objecting to a toll charge of 10 cents made for calls between exchanges at Cromwell and Syracuse. Both exchanges are owned and operated by the Central Lakes company, part of the patrons being served from one and the remainder from the other.

It was also found by the commission that the petition for investigation of the service had been signed by non-subscribers and by two or more persons using the same telephone.

Seeks a Permanent Injunction Against Cost Law in Wisconsin.

The Wisconsin Telephone Co. has secured a temporary injunction to prevent the Wisconsin Public Service Commission from enforcing the section of the 1931 "strict regulation" law regarding assessment of investigation costs against the investigated utility.

Judge August C. Hoppmann of the Dane County Circuit Court in Madison, granted the injunction to Miller, Mack and Fairchild, Milwaukee attorneys for the Wisconsin company. The injunction was secured to prevent the commission sending a final bill for more than $1,000 to the utility.

Following the granting of the temporary injunction, a hearing was held on September 25 as to whether the temporary injunction should or should not be made permanent. Judge Hoppmann took the matter under advisement.

J. G. Hardgrove of the law firm representing the telephone company in seeking to make the temporary injunction permanent contended that the powers granted by the legislature in the "strict regulation" law are powers which constitute a legislative function, and not one to be delegated to a non-legislative body, such as the public service commission.

The 1931 legislature enacted into law a bill by Sen. Thomas M. Duncan, now executive secretary to Gov. La Follette, which thoroughly revised the utility regulation law and increased the powers of the public service commission.

One of the new powers is the right to assess the costs of commission investigation of utilities against the utilities. The theory behind this charge is that the utility, and thus indirectly the customers who benefit by the investigation, should pay its cost rather than the general public through appropriations to the commission from taxes.

In the law, it is provided that the commission may, "in the public interest," exempt a particular utility from the investigation costs, after the facts have been found by the commission.

Two points made by the telephone company's attorney are:

1. The legislature does not lay down a

rule to guide the commission in determining when an investigation, the cost of which must be borne by the utility, may be ordered.

2. The legislature does not provide any rule to guide the commission in determining the "broad question" of whether the public interest is served if a certain utility be exempted from investigation costs.

David E. Lilienthal, public service commissioner, gave reasons for not making the injunction permanent. He cited several decisions of different supreme courts pointing out that a utility which has been granted special privileges to be exercised in the public interest can be charged the costs of services rendered to that utility.

"The legislature could not possibly lay out rules to guide the commission in determining every factor which is for the public interest," the public service commissioner asserted.

This law becomes operative upon the finding of the fact that there is need of an investigation, Mr. Lilienthal pointed out. "For many years the legislature has delegated authority to the Wisconsin commission to make investigations as to the reasonableness of rates, etc.," he said.

In determining the exemption of a certain utility from paying investigation costs the commission must act upon a finding of fact, the commissioner asserted. As an example, he cited the fact that if a certain utility were on the verge of bankruptcy at the time of the investigation, an exemption from paying the costs would be in the public interest.

Acting under authority granted by the new law, the Wisconsin Public Service Commission held a hearing on how costs should be assessed. Nearly 100 utility representatives attended the hearing. On September 8 the commission issued a general order on the subject.

On July 29 the commission had postponed for at least a year action on the request of the Wisconsin Telephone Co. for an increase in Madison telephone rates. The commission on that date also ordered a state-wide investigation of the Wisconsin Telephone Co.

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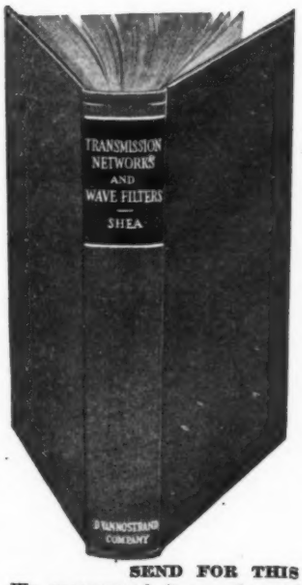
TRANSMISSION NETWORKS AND WAVE FILTERS

By T. E. SHEA, B. S., M. S.

Member of the Technical Staff, Bell Telephone Laboratories



The calculation and design of telephone networks and wave filters are fully presented in this book, written by Mr. T. E. Shea of Bell Telephone Laboratories. It embodies the most recent developments in this field as well as the standard practice.

"The Telephone Equipment of 1929," "The New Science Telephony," "Transmission Networks and Wave Filters" and "Radio Broadcasting Engineering" are a few of the subjects capably discussed in this valuable book.

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will involve the determination of that part of the utility property which is used and useful, and will include the determination of whether the company has built so far ahead that the overhead charges are too high. It will also involve the question whether in view of the company's modernization program, the present depreciation and maintenance charges are too high.

Under provisions of the order issued September 8 on assessment of costs, the commission on September 12 sent the Wisconsin Telephone Co. a tentative bill of $1,056.72 for auditing work done in the utility's Milwaukee offices as part of the state-wide investigation.

In ten more days, had the utility made no objection to the bill, the commission would have sent a final bill, under provisions of the general order.

Sending of the final bill is prevented by the temporary injunction. The utility complaint sets forth that such a bill would have constituted a first lien against the Wisconsin Telephone Co., and primarily its property in Dane county, the Madison exchange.

Recommends I. C. C. Refuse to Authorize Bell St. Paul Purchase.

At the hour of going to press, TELEPHONY received a report from Washington that Examiner Davis, of the Interstate Commerce Commission, has recommended to that body that it refuse to authorize acquisition by the Northwestern Bell Telephone Co. of properties of the Tri-State Telephone & Telegraph Co., in St. Paul and South St. Paul, Minn.

Court Upholds Commission Against Telechronometers.

The Washington Supreme Court on September 18 upheld the Washington Department of Public Works in its order prohibiting the use of the telechronometer on telephones in Everett, Wash., for measuring telephone service. The Washington department on July 1, 1930, ordered the West Coast Telephone Co., successor to the Puget Sound Telephone Co., to discontinue the use of telechronometers by October 1.

Telechronometers were first introduced in Everett in 1921. On April 1, 1922, the department ordered the telephone company to operate on metered rates for a period of 60 days. On September 25, 1922, the telephone company was ordered to return to the former flat rates. In 1923, the department ordered the telephone company to disconnect and remove the telechronometers, then attached to its plant, and to refund to certain subscribers a portion of the charges paid while telechronometers were in service.

In 1926, the department by order required the telephone company to return to the telechronometer system of measuring service on or before January 1, 1927.

An appeal from the commission's order of July 1, 1930, specifying discontinuance of use of telechronometers for measuring service, was instituted by the American Telechronometer Co., owner of the patent rights, before Judge John M. Wilson, of the Thurston County Superior Court, on September 23, 1930.

On November 19, the commission's order was reversed by Judge Wilson: "Were it not for the fact that I am convinced the department was without jurisdiction to hear the case and to make the order which it did because of the insufficiency of the complaint, I would remand the case for rehearing, but upon the record I think the order must be reversed and it is so ordered."

Appeal was then taken to the state supreme court by the Washington Department of Public Works and that body has just upheld the commission's order.

Rules Telephone Users Protective Company a Collection Agency.

An organization making an agreement with telephone users to obtain for them refunds of any moneys unlawfully collected from them by a telephone company is held by Attorney General U. S. Webb, of California, to be a collection agency under the California statute and is violating the law in operating without a license.

The opinion was given to Secretary of State Frank C. Jordan, and is based upon a contract between the Telephone Users Protective Co. of Los Angeles, Calif., and one of its subscribers. The opinion follows in full text:

"I am in receipt of your communication enclosing a photostatic copy of a contract between the Telephone Users Protective Co. of Los Angeles and one of its subscribers.

You desire to be advised whether or not the business conducted by this company constitutes a collection agency as defined in the collection agency law, statutes of 1927, page 485, as amended in 1931.

Under the provisions of section 2 of that act a collection agency is defined as including all persons, firms, corporations and associations engaging directly or indirectly and as a primary or a secondary object in the collection of or in soliciting or obtaining in any manner the payment of a claim owed or due or asserted to be owed or due to another.

Section 1 of the act provides that no person, firm, corporation or association shall engage in the business within this state of soliciting the right to collect or receive payment for another of any claim or advertise or solicit either in print, by letter, in person or otherwise, the right to collect or receive payment for another of any claim without first having secured a license under the act.

An examination of the contract used by the Telephone Users Protective Co. discloses that one of its principal purposes is to obtain for the subscribers the refund of any moneys illegally or unlawfully paid by the subscribers to the telephone company.

The contract states that it is the intention of the committee, either through civil acion, arbitration or compromise, to immediately proceed with the view of collecting for the account of said users and subscribers all illegal and unlawful overcharges inflicted upon them by the telephone companies during the past several years.

It would, therefore, appear that this association designated as the Telephone Users Protective Co. is soliciting the right to collect or receive payment for another of a claim and in this respect is violating the provisions of section 1 of the act regulating collection agencies.

It is the fact that the purpose of the agreement is not confined to the collection of the claims, but also is concerned with the making of an investigation of the alleged order of the railroad commission and the books of the telephone company for the purpose of protecting the rights of the users under the public utility law.

However, a reading of the agreement discloses that the principal object to be attained by the company is the collection of the claims which the telephone users may have against the various corporations named therein.

I, therefore, am of the opinion that this company is conducting a collection agency as the same is defined in the act of the legislature hereinbefore referred to."

New Base Rate Zone Authorized for Florida Company.

Creation of another base rate zone by the Intercounty Telephone & Telegraph Co. for serving the town of Charlotte Harbor, Fla., and extending toll lines into Boca Grande, has been approved by the Florida Railroad Commission.

Rates for the new zone also were approved. These range from $3 for a party residence telephone to $5 for a one party business. The new rates go into effect November 1.

The telephone company is laying a cable across Peace river at Punta Gorda to serve Charlotte Harbor and provide toll service to Boca Grande. The creation of the new base rate zone was made necessary to serve Charlotte Harbor upon a flat rate basis rather than a mileage basis from its Punta Gorda exchange. The new flat rate will be considerably lower than the mileage basis rate, it was said. The new zone embraces the greater part of the town of Charlotte Harbor.

Authorized to Discontinue Service from Small Exchange.

Under date of September 18, the Wisconsin Public Service Commission authorized the Westboro Telephone Co., of Westboro, to discontinue its Westboro exchange

The efficiency of the receiver under test as compared to the standard receiver is then found by subtracting the setting of the variable loss network from the fixed loss network. It should be understood that the expression of receiver efficiency in terms of its transmitting ability is arbitrary.

The receiver test, while not as accurate as the transmitter test, will give good results and will be found very effective in detecting receivers with weak magnets, short-circuited coils, improper air-gap spacing, etc.

The test word "retribution" is recommended because it is so composed as to give a sustained deflection of the volume indicator needle. Any other word might be used, although words which might be composed of nearly single-frequency sounds should be avoided.

Reference to Fig. 5 will show that the fixed loss network is 15 db and the variable loss network 20 db. This permits testing transmitters or receivers which are as much as 15 db poorer or 5 db better than the standard elements. It is assumed that the range of 5 db above standard will be sufficient for apparatus ordinarily tested.

Fig. 5 shows the complete testing circuit, which is arranged to test either common battery or magneto subscriber sets, individual transmitters and receivers, or induction coils. This circuit, while somewhat more elaborate than small companies will need, is an ideal arrangement for the larger companies.

Tests Individual Elements Also.

This circuit is arranged to test complete subscriber sets, as previously described, but it tests individual elements by substituting for the standard elements. For example, if it should be desired to test a local battery transmitter, the test jack attached to key No. 7 would be connected to the transmitter and the standard transmitter plugged into the jack connected to key No. 7. The standard receiver would be plugged into the jack connected to key No. 8 and this key operated to connect the receiver in circuit.

Key No. 1 would be thrown to the local battery set. With key No. 7 operated to connect the standard transmitter in circuit, and keys Nos. 5 and 6 thrown to the up or fixed network position, the tester would repeat the test word into the standard transmitter, and note the deflection. He would then throw key Nos. 5 and 6 to the variable network position, and key No. 7 to the test transmitter, and would again repeat the test word and adjust the variable loss pad until the deflection is the same as with the standard transmitter.

The efficiency of the transmitter under test would then be equal to the difference in decibels between the setting of fixed and variable networks.

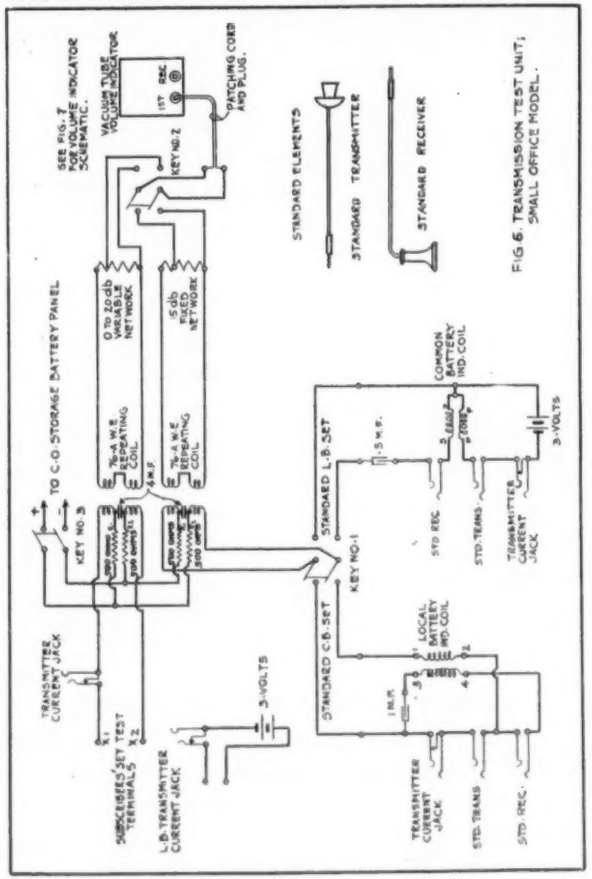
It will be seen that the method of testing individual elements differs from the method of testing complete subscribers' sets in that the standard circuit is connected to the fixed network when talking over the standard transmitter

or receiver, and it is connected to the variable network when talking over the elements under test.

Induction coils are tested the same as transmitters or receivers, by substituting for the standard elements.

Jacks are shown in all of the transmitter circuits for the purpose of measuring the current taken by the transmitters. It is essential in common battery telephones that the battery supply condition be the same, otherwise an inaccurate test will be obtained.

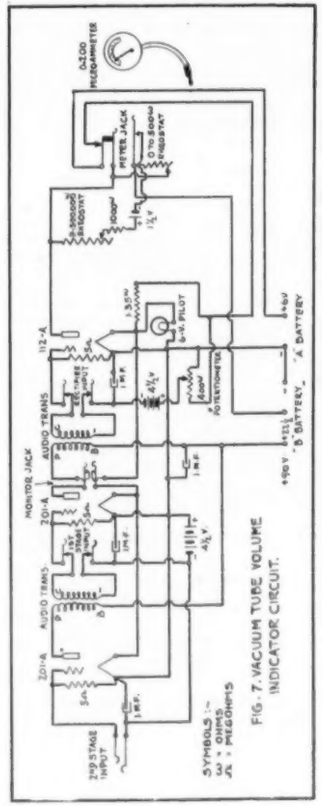
The necessity for switching from standard to test element, and from throwing the standard subscriber's set from fixed to variable network can be eliminated. Connect a sub-



scriber's set to the subscriber set test terminals. Then connect the individual transmitters and receivers to be tested to this subscriber's set. A circuit suitable for the smaller offices is shown in Fig. 6. One feature not shown in the illustration is the method of operating several keys with one movement. This is accomplished by means of a small metal crossbar to which is soldered three brass tubes.

These tubes are so spaced that they will slip over the operating handles of three keys, thus permitting the three keys to be operated simultaneously. This facilitates tests which involve operating several keys at once. The keys must be mounted in a row if this feature is used.

The purpose of the vacuum tube volume indicator is to indicate a balance between the voice level passing over the fixed network, and that passing over the variable network. It is merely a balance meter and not a calibrated measuring arrangement.



It operates as follows: According to Fig. 7, the circuit consists essentially of a two-stage voice frequency amplifier followed by a detector (rectifying) tube and a sensitive micro-ammeter in the plate circuit of the detector. The input terminals of the volume indicator are arranged to be connected to either the fixed or variable networks by means of a switching key.

When the tester talks over the networks the alternating current voice wave is impressed on the grid of the first tube, where it is amplified and passed onto the detector or rectifying tube. The normal negative grid voltage on this tube is of such a value that the tube acts as a rectifier instead of an amplifier. The amplified alternating current voice wave is rectified, and an increase in the plate current of this tube results.

News Facts Education Assistance

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Telephony

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MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices not previously published.

POLES

"Handbook of Practical Information About Cedar Poles and Butt-treating," is the title of a 40-page, illustrated book now available. **Page & Hill Company, Minneapolis, Minn.**

WOOD PRESERVATIVE

An eight-page booklet entitled, "ZMA for Wood Preserving," regarding the different uses of ZMA wood preservative. **Curtin-Howe Corporation, 405 Lexington Ave., New York City, N. Y.**

Notices previously published.

AUTOMATIC SWITCHBOARDS

Bulletin 576, "Installation of Sectional-Type Strowger Switching Equipment," shows strikingly how sectional design has simplified the installation of automatic switching equipment. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago.**

CHESTNUT POLE TIMBER

Eight-page bulletin describing specifications, treating methods and general information regarding chestnut poles. **American Forest Products Co., Inc., 122 East 42nd Street, New York City, N. Y.**

MAGNETO EQUIPMENT

New 72-page general catalog prepared expressly for magneto exchanges. It completely covers all necessary equipment, apparatus, and supplies for magneto plants. **Kellogg Switchboard & Supply Company, 1066 West Adams Street, Chicago, Ill.**

RINGING CONVERTERS

Bulletin No. 150 entitled "Leich Ringing Converters" describes and illustrates converter equipment for producing ringing current; this includes harmonic converters, ringing frequency converters and ringing converters with charger equipment. Leich Electric Co., Genoa, Ill.

SALES CAMPAIGNS

Two Small Folders specially designed for extension sales campaigns are now available. They will be furnished complimentary all ready for insertion with your monthly bills—they can be obtained in any quantity required. **American Electric Company, Incorporated, State & 64th Streets, Chicago, Illinois.**

SWITCHBOARDS (P-A-X's)

The Strowger Type 31 P-A-X provides facilities for handling trunk calls at any station, thus eliminating the attendant's cabinet. It is described in an illustrated circular, which has just come off the press. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

TELEPHONES

Bulletin 1034, a completely revised and enlarged catalog of Strowger Dial Telephones and Telephone Parts, both for central battery and for local battery service. Among the new items included are pay stations, the Strowger Telephone Call Recorder, and the filter coil unit for eliminating radio interference from subscribers' dials. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

TELEPHONE SUPPLIES

Condensed price list No. 637 applying to catalog No. 91, gives new prices of Kellogg switchboards, telephones, apparatus and supplies. **Kellogg Switchboard & Supply Company, 1066 West Adams Street, Chicago, Ill.**

WOOD POLE SPECIFICATIONS

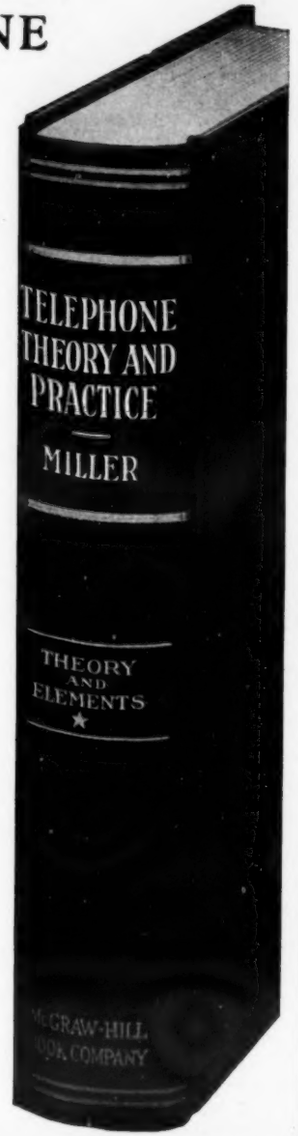
A special folder has been prepared showing the specifications and dimensions for western red cedar, northern white cedar, southern pine and chestnut poles approved by American Standards Association under the sponsorship of the A. S. A. Telephone Group (Bell Telephone System and United States Independent Telephone Association.)

When writing please mention TELEPHONY

TELEPHONE THEORY and PRACTICE

Theory and Elements

by **Kempster B. Miller**



Fellow, American Institute of Electrical Engineers; Member, Western Society of Engineers; Author of American Telephone Practice, 1904, and Joint Author of Telephony, 1912.

Here is a book that comprehensively covers those introductory and theoretical elements of telephony needed for study and reference by workers in all stages of the profession. It is written by an authority; a man connected with practical telephony for more than thirty-five years. Although the first volume of a three-volume series, this book, Theory and Elements, represents an independent, complete and up-to-date treatment of its subject. A thorough groundwork in the background and principles of telephony is given, which will serve:

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Telephony Publishing Corporation

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and serve the subscribers direct from its Rib Lake exchange. This is with the understanding that the only change in the class of service given to the subscribers will be that some of the local subscribers who are now receiving single or two-party service will be changed to four-party service, and with the further understanding that the work of changing over to the Rib Lake exchange will be completed by December 1, 1931.

All but three of the company's subscribers at the Westboro exchange agreed to the discontinuance of the exchange at that point with the understanding that the arrangement will give free service to Rib Lake but will discontinue free service to Whittlesey and Ogema, Wis.

Minnesota Company Returns Considered Too High by Commission.

The Pelican Telephone Co. of Pelican Rapids, Ottertail county, Minnesota, has been ordered by the Minnesota Railroad & Warehouse Commission to reduce its rural rates. The new rates, effective October 1, are $3.00 per year lower than the present which are $21 per year gross, or $18 net, for rural residence metallic circuit telephones, and $18 per year gross, or $15 net, for rural residence grounded circuit telephones.

Two petitions containing a total of 117 signatures were presented to the commission requesting an investigation of the rural rates of the company.

The Pelican Telephone Co. was organized March 15, 1904. The only stocks and bonds outstanding, on December 31, 1930, were 737 shares of common stock of a par value of $25 per share, or a total par value of $18,425. The company has for the 17-year period, 1914 to 1930, inclusive, declared and paid dividends on this common stock in the sum of $16,948, or an average of $996.94 per year, which is equivalent to an average annual dividend of 5.41 per cent, computed upon the par value of the stock.

For depreciation the company has charged annually to operating expenses for the 17-year period, 1914 to 1930, inclusive, an average of 5.22 per cent of the book cost, undepreciated, of its telephone plant. This was declared by the commission to

National Telephone & Telegraph Corporation
(Subsidiary of Associated Telephone and Telegraph Company)
100 WEST MONROE STREET
CHICAGO, ILLINOIS

DIVIDEND NOTICE

The Board of Directors of National Telephone & Telegraph Corporation has declared the regular dividend of $1.75 per share on the First Preferred stock and 88c per share on the Class A stock for the quarter ending October 31st, 1931, payable November 1, 1931, to stockholders of record at the close of business October 17th, 1931.

R. J. MUNRO,
Secretary.

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be too large an amount; 3 per cent would be a liberal allowance in the instant case, it stated.

It is stated, in this case, that the plant is in good condition, excepting for a few lines in the outlying districts, built of 20 and 25-foot poles. These poles could easily and cheaply be cut down to shorter length poles, thereby making all lines in good condition.

The new rates if applied to the "fair present value" of $47,365.78, claimed by the company, the commission said, would have given a return of 5.84 per cent in 1928, 7.25 per cent in 1929 and 5.94 per cent in 1930.

On the fair present value of the property as found by the commission, $38,000, the return under the new rates would have been 7.28, 9.03 and 7.41 per cent respectively for the three years, it is stated.

Commission Dismisses Complaint Against Competing Company.

The Wisconsin Public Service Commission has dismissed the complaint of the Jerpen & Valders Telephone Co. against the Liberty & Newton Telephone Co. on giving service to the village of St. Nazianz. The former company sought to bar the Liberty & Newton line at St. Nazianz under the law passed in 1911 regulating competition of utilities.

The Liberty & Newton company was preparing for an extension of its service in the village when the Jerpen & Valders company filed a complaint holding that the Liberty & Newton company had practically abandoned its service at St. Nazianz since last year.

The findings of the commission are that the Jerpen & Valders company extended its lines to St. Nazianz in 1906 or 1907 while the Liberty & Newton company entered the village in 1908. The business of the Liberty & Newton company, which operates through the Baryenbruch exchange with three other companies, dwindled until only one subscriber remained. In 1930 an extension was made to another subscriber.

Both companies use the same poles and the complaint of the Jerpen & Valders company that the grounded circuit of the other company interfered with its service was held to be incorrect. The commission held that the cause probably lay somewhere else and that its engineers would be available to solve the trouble.

Recently the company secured other patrons and an extension was planned. It was this extension that the complainant desired to prevent. In the hearing it was claimed that the Liberty & Newton line and the three others with which it operated at Baryenbruch had free toll connections with the Manitowoc exchange provided for patrons, while a toll service charge had to be made by the Jerpen & Valders line.

The commission ruling cited this in its opinion and held that the public at St. Nazianz was entitled to the advantage if it desired. No ruling was made upon the question of extension of the Liberty & Newton lines in the village. The necessary application for the extension of the service will be filed in a short time.

Summary of Commission Rulings and Schedule of Hearings.

ALABAMA.

October 14: Hearing in Montgomery on application filed by Mrs. T. A. E. Wilson asking approval of the sale of the telephone properties at Dozier to Dewey Capps.

CALIFORNIA.

September 23: Associated Telephone Co., Ltd., authorized to install handset equipment in its Covina exchange, Los Angeles county, at a rate for the desk telephone service plus an additional 25 cents a month.

September 23: Time extended from October 1, 1931, to December 31, 1931, in which the Associated Telephone Co., Ltd., may comply with certain requirements laid down by the commission in authorizing the sale of the Ontario & Upland Telephone Co., the Pomona Valley Telephone & Telegraph Union, and the Home Telephone & Telegraph Company of Chino to the Associated Telephone Co., Ltd.

September 25: Order issued authorizing the Dos Palos Telephone Co. to put into effect a rate revision contingent upon the company changing its grounded lines to metallic circuits.

ILLINOIS.

October 7: Hearing in Springfield before Commissioner Collins on proposed advance in rates by the Illinois Commercial Telephone Co. in Bethany, county of Moultrie, stated in rate schedule I. C. C. No. 2 of the company.

September 8: Order issued approving traffic agreement between the Illinois Commercial Telephone Co. and the following companies:

The Secor Telephone Association; the Granville Telephone Co.; the Farmers Mutual Telephone Co., of Lostant; and the Eureka Telephone Co.

September 8: Order issued authorizing the Rossville Telephone Co. to withdraw its rate schedule I. C. C. 1 wherein the company proposes an advance in rates for toll service and dismissing case without prejudice.

September 8: Inter-County Telephone Co. sheets 1 to 4 and 7 to 9, inclusive, filed applicable to service in Mt. Olive and vicinity, correcting present practices of the company relative to billing and collections and also to include certain rules and regulations in addition to the present rules and regulations on file with the commission, effective October 15. No action was taken by the commission.

INDIANA.

September 26: Petition denied of Mrs. Louise Steinacker and a group of others against the Central Lakes Telephone Corp. complaining of service at Lake Wawasee. The commission order said the complaint appeared to be chiefly over a 10-cent toll charge between Cromwell and Syracuse, instead of the service.

September 28: The United Corp., Abilene, Kans., filed petition for permission to buy the Newton White Telephone Co., operating exchanges in Goodland and Wolcott. The company proposes to give 4,000 shares of United Corp. common stock in exchange for the telephone company property.

MASSACHUSETTS.

October 14: Continued hearing from September 23 on petition of the Boston Central Labor Union for a reduction in the rates of the New England Telephone & Telegraph Co.

MINNESOTA.

October 13: Rehearing in Greenbush on complaint of Dr. A. J. Button against the Greenbush Telephone Co. charging unsatisfactory telephone service and requesting that night emergency service be rendered.

October 16: Hearing in Boy River, Cass county, on complaint of Peter Pichotta and Harvey E. Countryman, both of Boy River, relative to paying a switching fee for two centrals as well as a 25-cent increase in the switching rate charged by the Remer Rural Telephone Co.

November 20: Rehearing in St. Paul on petition of O. B. Sillerud, et al., filed April 8, 1931, and the petition of Alexander Small, et al., filed May 23 requesting an investigation as to the reasonableness of the present rates of $21 per year gross, or $18 per year net, for rural metallic circuit telephones; and $18 per year gross, or $15 per year net, for rural grounded circuit telephones as charged by the Pelican Telephone Co., at Pelican Rapids.

MISSOURI.

September 30: Approval granted application of G. E. Davis for a certificate of convenience and necessity to operate a telephone exchange at Stark City and Stella, and for authority to file rates.

NORTH DAKOTA.

September 24: Approval given the reduced schedule of telephone rates filed by the Central West Public Service Co. of North Dakota applicable to Neche.

September 24: Approval given the schedule of local exchange service rates filed by the Dakota Central Telephone Co. applicable to Napoleon and Wishek.

OHIO.

September 25: The Ohio Bell Telephone Co. authorized to establish a new two-party residence service in Cleveland at $2.75 a month for the first 50 calls and five cents for each additional call.

Similar service was authorized for the territory outside the base rate area but inside the Cleveland exchange district at $3.75 for 50 calls per month and 5 cents for each call above 50.

September 25: Application for lower rates on calls between Maple Heights and six Cleveland exchanges filed. The company proposes a 5-cent charge for the first five minutes of a call from the suburban exchange to the Broadway, Washington, Michigan, Diamond, Longacre and Sweetbriar offices in Cleveland. Five cents will be charged for each additional five minutes. The present charge is 10 cents for the first five minutes, and 5 cents for the next three minutes.

OKLAHOMA.

October 12: Hearing on complaint of the Beaver Chamber of Commerce against the Southwestern Associated Telephone Co. alleging inadequate service at Beaver.

October 15: Hearing on complaint of the mayor of Holdenville against the Southwestern Bell Telephone Co. for adjustment of rates.

October 20: Hearing on complaint of the citizens of Grandfield vs. the Southwest Telephone Co. for adjustment of rates.

October 20: Hearing on complaint of Otis Stofer vs. the Southwest Telephone Co. for adjustment of rates at Devol.

October 20: Hearing on complaint of citizens of Comanche vs. the Southwest Telephone Co. for adjustment of rates.